Coal Age

A McGRAW-HILL PUBLICATION JUNE, 1948

Being a Better Boss ..... p. 74

YOU CAN BE **SURE**.. IF IT'S

Westinghouse

—and NOW...

Needs No Lubrication

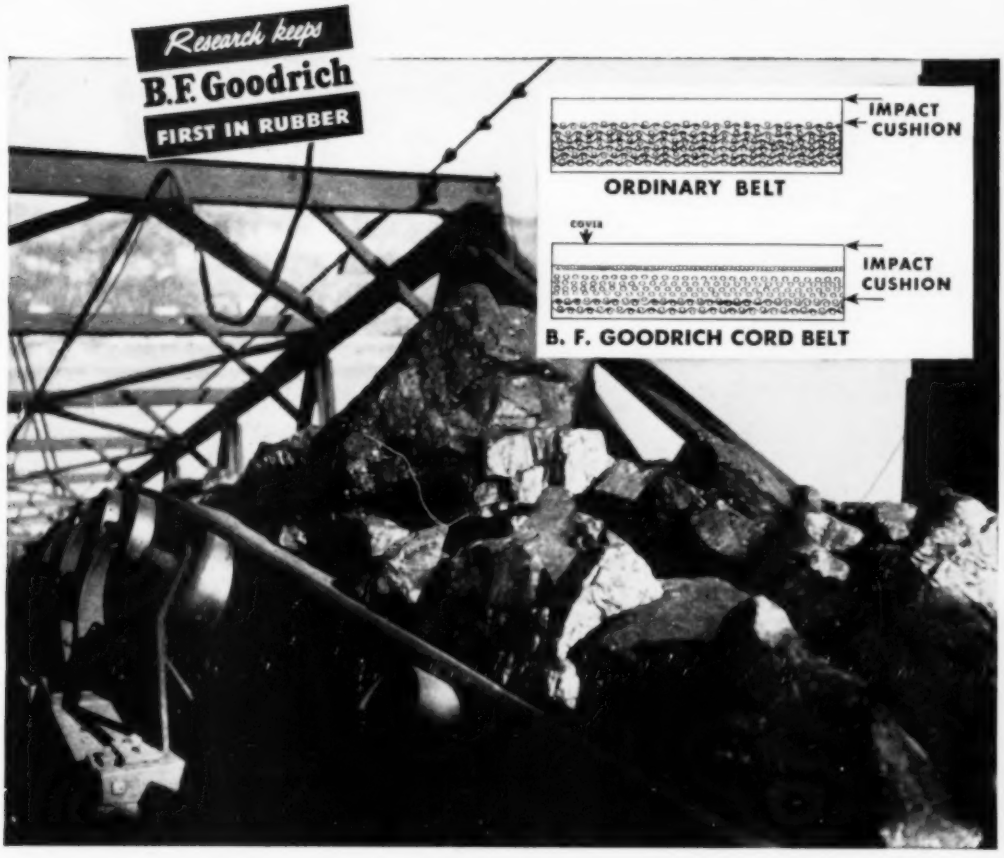
Now . . . for the first time . . . you can install electric motors, or motor-driven machines . . . and forget motor lubrication.

Westinghouse Life-Line . . . industry's amazing, new, all-steel motor . . . now completely eliminates need for lubrication. Life-Line motors are equipped with sealed bearings, pre-lubricated with a more-than-ample supply of specially treated lubricant. Correct lubrication is assured . . . machine outages are reduced . . . motor-drive problems are simplified, since motors can be located without need for constant accessibility.

Added to Life-Line's plate-steel protection, improved windings and more compact size, *pre-lubrication* is one more important reason for starting to convert, today, to Life-Line power. Standard ratings available from stock—others on short delivery. Ask your Westinghouse representative for prices and delivery on your requirements, or write Westinghouse Electric Corporation, P. O. Box 868, Pittsburgh 30, Pa.

J-21527-A

Westinghouse Life-Line Motors



B. F. Goodrich cord conveyor belt

Gives 2 to 6 times greater impact resistance, troughs better, lasts longer

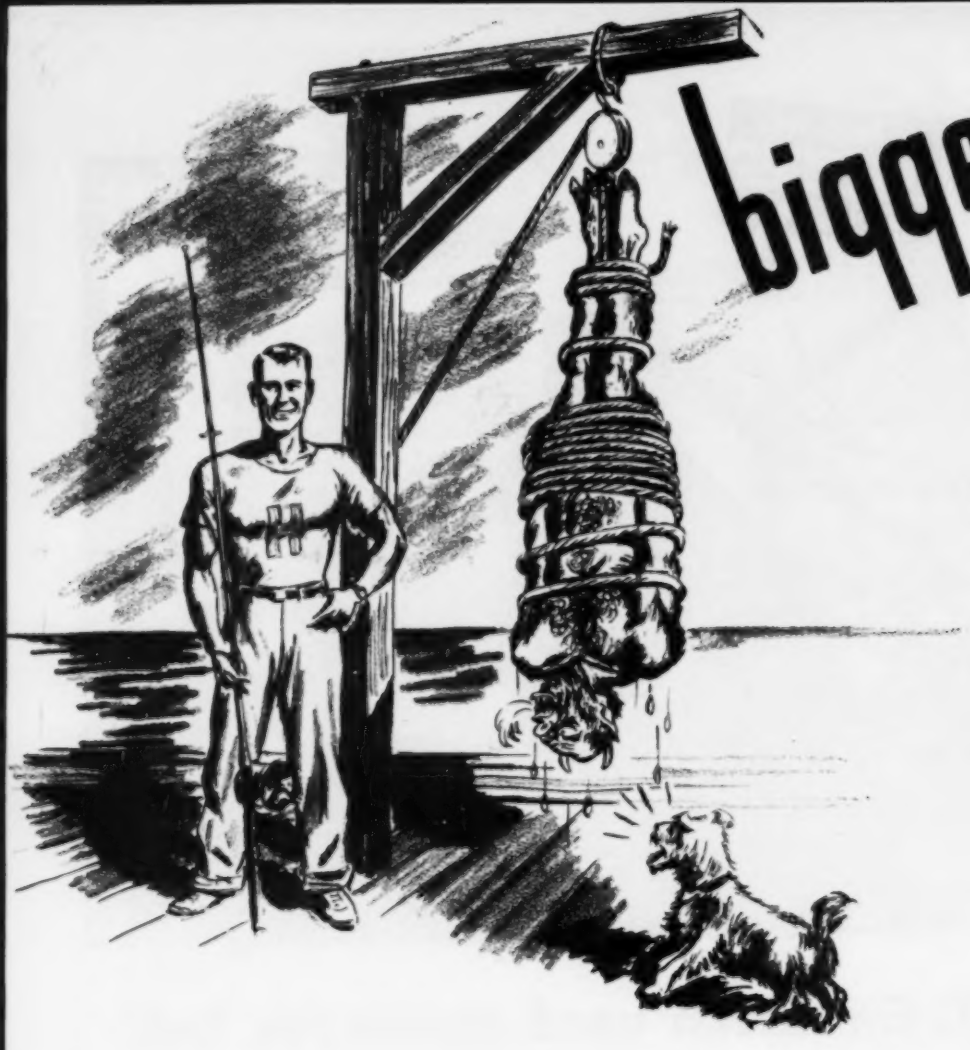
IN the cord plies of a B.F.Goodrich belt each cord is completely surrounded by rubber — no cross threads tie them together. These parallel cords are completely insulated from one another by rubber, free to "give" lengthwise and crosswise when an impact occurs. Thus the rubber can distort temporarily to distribute and absorb shocks that would damage a stiff, unyielding carcass. This augmented impact cushion means better belt service, longer belt life.

Cord belts trough better — Cord belts carry the load with less belt damage, less material "spill." Even thick, narrow cord belts trough naturally. And because they trough better, cord belts keep centered on the idlers, sustain less damage, require less maintenance. Longer centers, higher lifts can be used. Creasing action between idlers (as in a fabric-type belt) is eliminated.

Cord belts last longer, reduce costs — The better impact cushion of cord construction resists cuts and gouges. A transverse cord "breaker" floated above and across the main cord section helps cushion impact, keeps the cover from stretching beyond elastic limits, and provides better adhesion between cover and carcass. With each cord completely sealed in rubber, this BFG belt resists the effects of acid materials, moisture, mildew.

Cord belts for tough jobs — If your belts must take severe impact on loading or "over the idlers," cutting and gouging at the loading chute, exposure to moisture and acid materials, heavy loads with long centers and high lifts, you need BFG cord belts. Your local distributor will show you how they can save you money. *The B.F. Goodrich Company, Industrial Products Division, Akron, Ohio.*

B.F.Goodrich
RUBBER FOR INDUSTRY



Catch the big ones! Land the little ones! Not one Friction Devil gets away!!

Man oh man, the fishing's GREAT, with HULBURT QUALITY GREASE for "bait"!!!

HULBURT OIL & GREASE COMPANY, PHILADELPHIA, PA.

Specialists in Coal Mine Lubrication

catch you can make!

CATCH OLD FRICTION DEVIL !

IT'S EASY WITH

Hulburt Quality GREASE

Don't "fish around" for lubricants when you can get the ONE "Quality Grease" made specifically to do one job and do it perfectly—i.e. lubricate Coal Mining Machinery. In one word, HULBURT. For best net results, just throw us a line to pull in a HULBURT Lubrication Engineer. He'll go down into your mine and get things running right for you.

with mining machine cable . . .

it pays to look "under the hood," too

Of course—the outside jacket of mining machine cables is of prime importance to safety and long trouble-free cable life. That's why we stress the extra advantages you get with the new Hazaprene ZBF Sheath: more flame resistance; sun, oil, water and acid resistance; still greater resistance to wear, tear and abrasion.

But what about the conductor insulation? With Hazacord you get the extra protection and longer service life provided by Performite heat-resisting insulation. With a temperature rating of 75C, this better grade rubber insulation gives Hazacord approximately 25% greater margin of safety to withstand overload surges than is obtained with ordinary insulation.

And consider fillers in cable construction. Jute fillers can sometimes act like a wick—drawing trouble-making moisture into the cable interior. So when fillers are necessary, Hazard puts only Hazaprene fillers into Hazacord portable cables. Again it's extra insurance for you against trouble. There's a Hazacord engineered for reel cable service, stripping shovels, portable equipment—every type of mining machine.

It will pay you to get all the facts about Hazacord today. Ask your Hazard representative or write Hazard Insulated Wire Works, Division of The Okonite Company, Wilkes-Barre, Pa.

HAZARD

5260

insulated wires and cables for every mining use

Coal Age

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Volume 54 — Number 6

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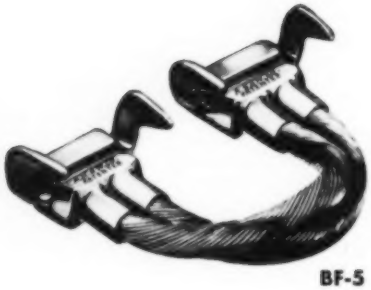
50,000,000* Butt Welded Rail Bonds . . .

they *must* be good!

BF-10

BF-3

BF-1



BF-5

question:

What is the best method of attaching a flexible strand to a solid end piece so that the connection will have both the highest electrical conductivity and the greatest mechanical strength?

possibilities:

Soldering, drop forging, cold pressing, brazing, flame welding, or butt welding.

answer:

Butt Welding! Only with machine butt welding can consistent electrical and mechanical results be obtained with clock-like regularity. Only with butt welding can you be sure that in every case all the wires in the strand are electrically connected permanently to the solid end piece. Only butt welding will consistently develop full strength of the strand on a tensile test to destruction. *The butt weld is stronger than the strand!*

Butt welding has found a wide application in the art of rail bonding, and we are proud to announce that the 50 millionth butt weld bond has been produced by the industry —with more and more following every day!

What greater proof of its reliability can be had?

Specify TIGERWELD Bonds . . . they're *all* butt welded!

*Covered by Patent Numbers 2,008,786, 2,008,787, 2,023,317, 2,213,990.

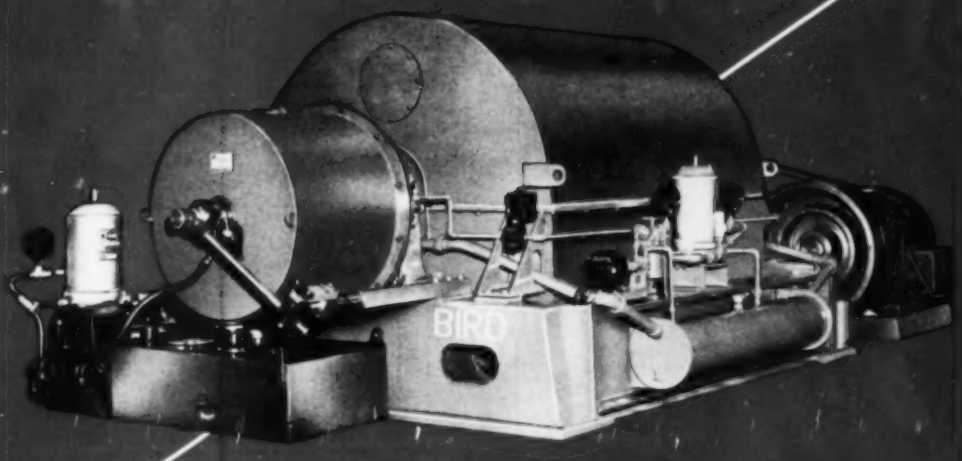
AMERICAN STEEL & WIRE COMPANY, GENERAL OFFICES: CLEVELAND, OHIO
COLUMBIA STEEL COMPANY, SAN FRANCISCO, PACIFIC COAST DISTRIBUTORS
TENNESSEE COAL, IRON & RAILROAD COMPANY, BIRMINGHAM, SOUTHERN DISTRIBUTORS
UNITED STATES STEEL EXPORT COMPANY, NEW YORK

USS

American Tigerweld Rail Bonds

UNITED STATES STEEL

THIS BIRD IS THE ANSWER
TO YOUR MOST CRITICAL PREPARATION PROBLEM *



*Recovering And Drying The Fine Coal
And Closed Circuiting The Water

The Bird Coal Filter performs the complete dewatering job, getting the coal at least as dry as can be obtained with any other equipment.

The Bird leaves so few solids in the separated water that a closed water circuit can be effected.

The Bird handles a huge volume of fine coal and water. It runs for long periods without shutdowns for maintenance. It is now providing these extraordinary advantages in a considerable number of preparation plants.

May we mail you the whole story?

BIRD MACHINE COMPANY
SOUTH WALPOLE • MASSACHUSETTS

Want to Boost Output

MANY COAL OPERATORS HAVE INCREASED OUTPUT WITH RIPL-FLO SCREENS . . . HOW ABOUT YOU?

RIPL-FLO VIBRATING SCREENS transmit a smooth, circular motion to every point on screen surface . . . resulting in rapid stratification with no "dead" spots on screen. That means increased capacity — lower screening costs for you!

They're built with only two bearings. Elimination of outer bearings and main frames reduces width 17 percent over comparable screens; weight by as much as 36 percent. Lower power requirement — less maintenance!

Screen surfaces can be changed or tensioned quickly by means of convenient clamping plates. Side frames are identical to allow installation of additional decks in the field.

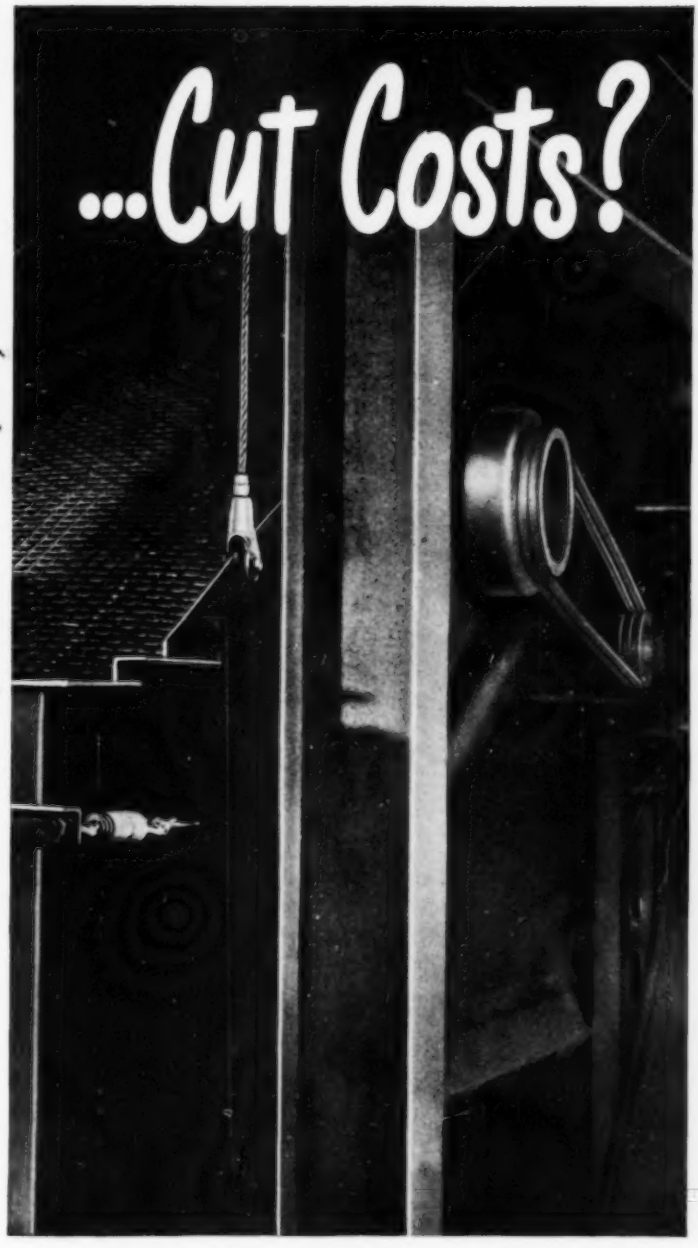
Modern Ripl-Flo screens are widely used for screening ROM coal in sizes up to 22 inches . . . for sizing egg, range and stoker grades . . . for refuse dewatering.

Coal men like the many high strength features built into Ripl-Flo screens. High tensile steels . . . all-welded construction . . . "stress-relieved" to eliminate strain around welds.

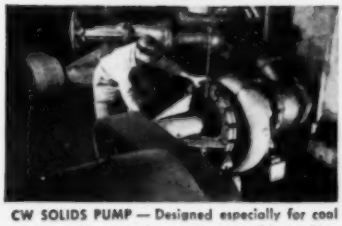
Experienced Allis-Chalmers field engineers are trained to help you select equipment that's *right* for your *job*.

Ripl-Flo screen sizes are 3 by 6 to 6 by 16 ft. For more information contact the A-C representative in your area or write for Bulletin 07B6151B.

ALLIS-CHALMERS, 968A SO. 70 ST. MILWAUKEE, WIS.



OTHER COST-CUTTING TONNAGE-INCREASING PRODUCTS FOR COAL



CW SOLIDS PUMP — Designed especially for coal washing. Has only five easily accessible working parts which can be removed without disturbing piping. Handles up to 40% solids in suspension. Allisite parts give high abrasion resistance. **Bulletin 08B6381B.**

ALL-ELECTRIC HOISTS—Allis-Chalmers builds hoists plus all auxiliaries . . . in any size . . . each installation specifically engineered for your requirements. Automatic Regulex control assures smooth operation at peak loads, low hoisting costs.

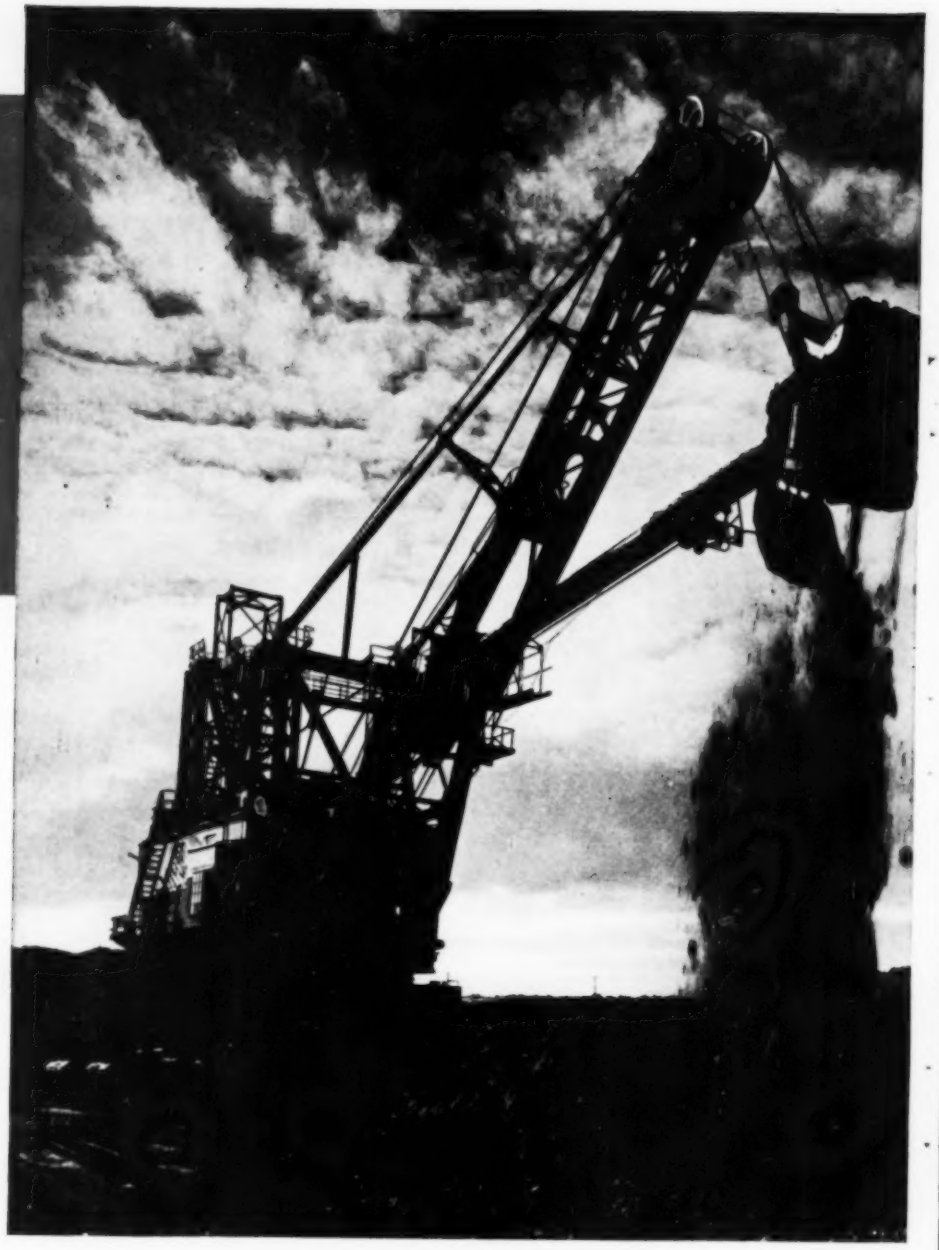
LOW-HEAD VIBRATING SCREENS—Used with reverse End-Tension Deck for dewatering small sizes of stoker grade coal and for screening and dewatering sludge . . . with side tension deck for dewatering larger coal. Sizes 3 by 6 to 6 by 16 ft. **Bulletin 07B6330A.**

A 2560

Ripl-Flo, Low-Head, Allisite and *Regulex* are Allis-Chalmers Trademarks.

ALLIS-CHALMERS

. . . Builds for Coal Progress!



Tune in . . .
TEXACO STAR THEATRE
presents MILTON BERLE
every Wednesday night.
See newspaper for time
and station.

TEXACO

TEXACO LUBRICANTS

FULL PROTECTION FOR HYDRAULIC MECHANISMS

Keep hydraulic systems free of rust and sludge by using Texaco Regal Oils (R & O)

CHARGE the hydraulic mechanisms on your shovels, dump trucks and other equipment with *Texaco Regal Oils (R & O)*. You'll get smoother, more efficient operation . . . spend less time and money on maintenance . . . avoid costly stoppages.

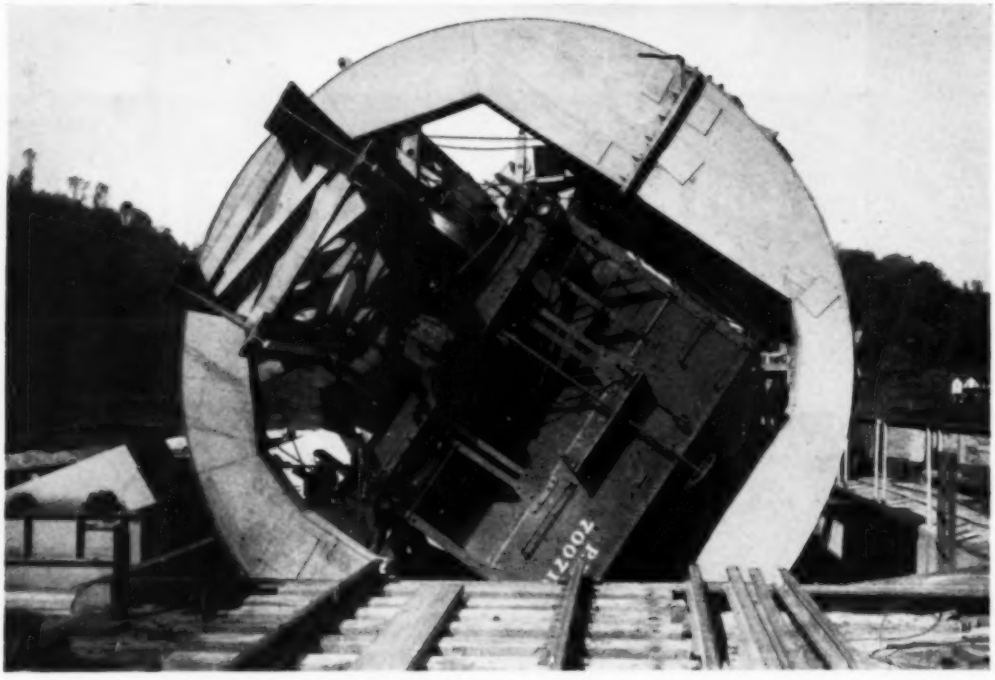
Texaco Regal Oils (R&O) are ideal hydraulic mediums – high quality turbine-grade oils strongly inhibited against rust and oxidation, and specially processed to prevent foaming. They guard hydraulic systems against formations of rust and sludge – keep the systems *clean* so that fewer cleanings, drainings and overhauls are required.

No "cutting back" is necessary when you use *Texaco Regal Oils (R & O)* because they are available in viscosities suitable for every type and size of hydraulic mechanism in all seasons. *Texaco Regal Oils (R & O)* are recommended by leading hydraulic equipment manufacturers, and many ship their units already charged with these fine oils.

A Texaco Lubrication Engineer will help you select the Texaco Lubricants you need to assure top efficiency in all your mining operations. Call the nearest of the more than 2300 Texaco Wholesale Distributing Plants in the 48 States, or write The Texas Company, *National Sales Division, Dept. C.*, 135 East 42nd Street, New York 17, N. Y.

KEEP TONNAGE ROLLING – Cars start and roll more easily when you lubricate wheel bearings – plain, cavity hub or anti-friction – with *Texaco Olympian Grease*. It stays *in* the bearings, assures smoother operation, reduces frictional "drag." Use it to keep tonnage rolling – to reduce bearing maintenance costs.

For the Coal Mining Industry



LIGHTWEIGHT
EFFICIENT
ECONOMICAL

EC

The Eastern Car Dumper design offers the only real advancement in railroad car dumping equipment in years. With this lightweight, compact mechanism, the complete dumping cycle requires only 90 seconds, starting with the loaded car in an upright position, tilting a **full 180 degrees**, and returning empty to normal position—ready for spotting of the next loaded car. No side-shifting of the car is necessary, and a new supporting arrangement allows automatic adjustment of the dumper to any width railroad car.

For speed, ease, and low-cost operation, you'll find that the Eastern Car Dumper fits perfectly into your material handling operations.

* * *

Designers, Builders, Erectors
of
RAILWAY CAR ROTARY DUMPERS
MINE CAR ROTARY DUMPERS
CAR SHAKERS
Fabricators of SPECIAL WELDMENTS,
MINE STRUCTURES AND EQUIPMENT

Write for Bulletin No. 847.

EASTERN CONSTRUCTORS, INC.

POLAND, OHIO PLANT, WARREN, OHIO

"CAT" Diesels stand up

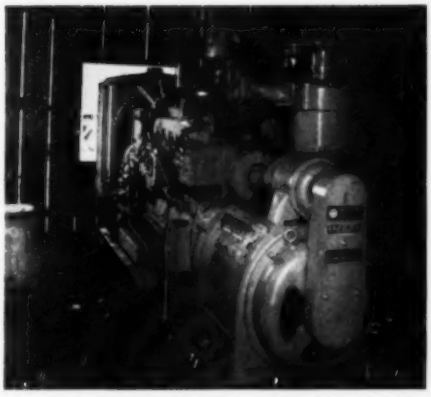
The Green Coal Company, of Owensboro, Kentucky, uses a "Caterpillar" Diesel D318 Electric Set to furnish power for the feeder, a 100-foot belt conveyor and all the lights.

This electric set generates 45 kw. per hour and operates 8 to 9 hours a day, 25 days a month. It's an important factor in the mine's monthly production of 25,000 tons.

R. H. Bogle, of the Green Coal Company, says: "We think our 'Cat' Diesel is the best. It just sits there and runs all day. We check it in the morning and shut it off at night. We prefer 'Caterpillar' to anything else because it stands up."

Your "Caterpillar" dealer is ready to help you with your power problems. See him today, and place your order for an engine or electric set.

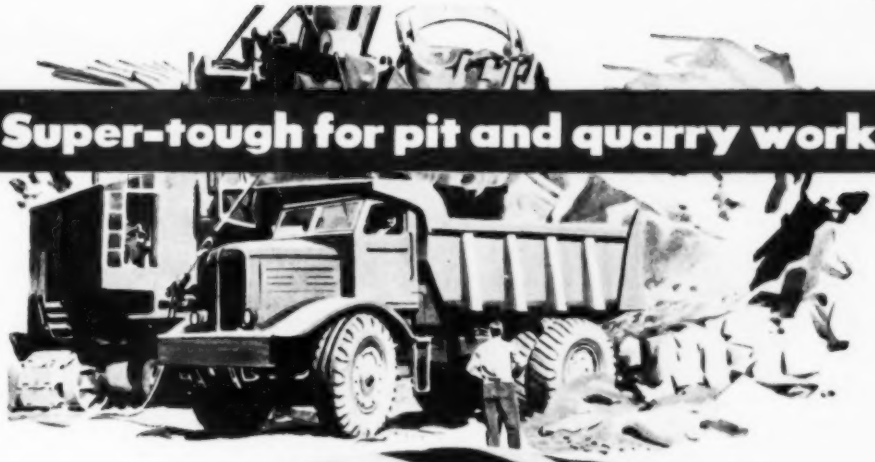
CATERPILLAR TRACTOR CO. • PEORIA, ILLINOIS

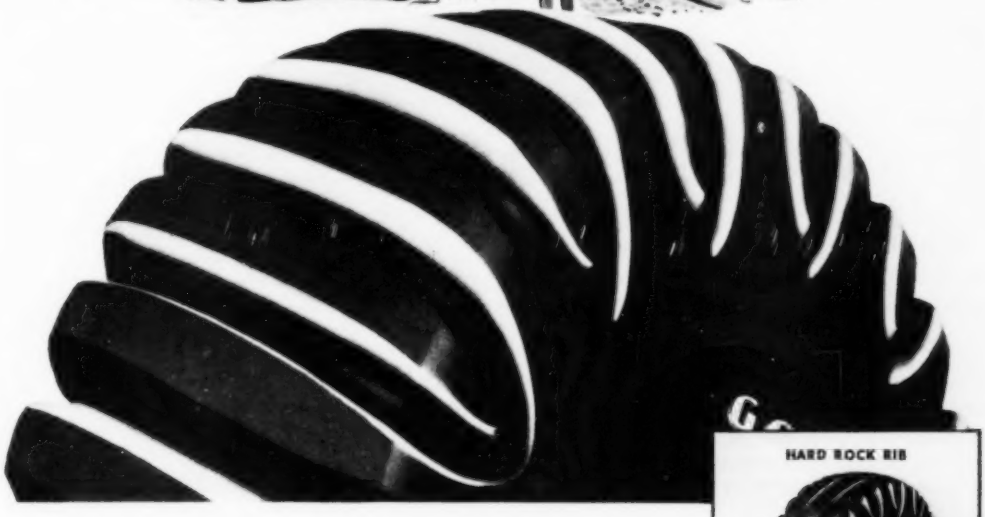


Green Coal Company's mine near Owensboro, Ky., and the "Caterpillar" Diesel D318 Electric Set which supplies power. Price of the self-regulated model, with gasoline starting engine, is $4550, F.O.B. Peoria. Prices subject to change without notice.

New Places for
PREFORMED
WIRE ROPE
Men who build new machines and men who run old ones know that Preformed Wire Rope is an efficient, economical and dependable medium for transmitting motion.
BECAUSE—
• Preformed lasts longer
• Preformed handles easier
• Preformed is safer to use
• Preformed saves installation time
Now is the time to take advantage of the savings Preformed wire rope offers. Ask your supplier about it. Then specify Preformed wire rope on your next order.

Super-tough for pit and quarry work





HERE you see the super-tough, super-stamina tire that pit and quarry operators say is unequalled for tire-ripping, tire-bruising jobs! It's the Goodyear Hard Rock Lug—the job-designed work tire for superior off-the-road service.

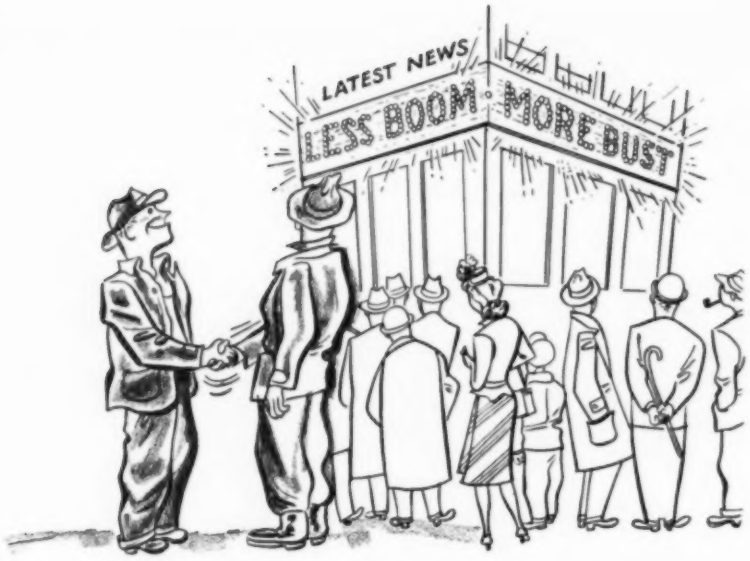
Just look at those massive lug bars. See how they armor tread and sidewalls against cuts and snags. Notice the self-cleaning universal tread that provides equal pulling power forward or reverse. And what you can't see, is an extra-thick, extra-tough undertread that protects the carcass against bruising.

Try the Hard Rock Lug on your trucks—on your toughest jobs—for low-cost long-life performance. Then you'll discover why, *year after year, more tons are hauled on Goodyear work tires than on any other kind.* Remember, always BUY and SPECIFY Goodyear—it pays!

HARD ROCK RIB

Companion tire for front wheels in mining work—easier steering, smooth rolling, same cord body, same shoulder and sidewall protection as Hard Rock Lug.

GOODYEAR



Good News for Blasters!

THE ROCKMASTER 16 Blasting System is *new*. And it's good news for blasters. *Now*, Atlas brings you a *sixteen-stage* milli-second delay system that cuts noise and vibration as much as 60% . . . gives you better breakage that reduces the cost of handling and milling rock.

There's more to this story. ROCKMASTER 16 helps you produce more material per pound of explosive . . . gives you more footage per round. *Sixteen* periods—a wide choice of short or long milli-second delays—add up to better control over throw, back-break, and material size. *Sixteen* delay periods fire within 550 milli-seconds!—there's less strain on timbers and roof . . . less dust and a quicker return to the face.

From pits, quarries, underground workings, and construction jobs we hear that ROCKMASTER 16 cuts drilling and secondary shooting . . . saves on time, labor, and dynamite. No wonder they're saying "*ROCKMASTER 16 is the greatest improvement in blasting methods since Atlas introduced milli-second blasting in 1945.*" Ask your Atlas representative to show you where ROCKMASTER 16 fits into your operations.

ROCKMASTER 16 TIMINGS

Rockmaster No.	Avg. Time of Each Delay from Zero (milli-seconds)
0 (zero)	0 (inst.)
1	8
2	25
3	50
4	75
5	100
6	125
7	150
8	175
9	200
10	250
11	300
12	350
13	400
14	450
15	500
16	550

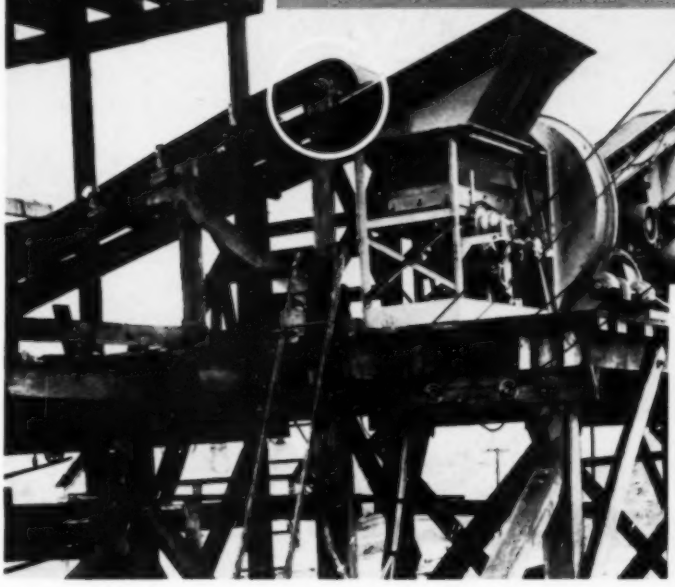
ROCKMASTER: Reg. U. S. Pat. Off.

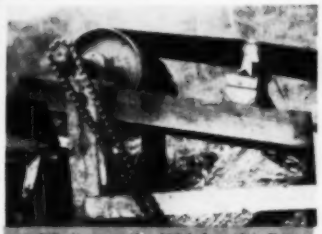
ATLAS EXPLOSIVES
"Everything for Blasting"

CHEMICALS ATLAS EXPLOSIVES

ATLAS POWDER COMPANY, Wilmington 99, Del. • *Offices in principal cities* • *Cable Address—Atpowco*

CLEANER COAL ..... Prolonged Crusher Life ..... LOWER COSTS ..... with *Eriez* Permanent Non-Electric Magnetic Pulleys .....





A 24" diameter by 30" belt width Eriez pulley cleans coal of tramp iron to eliminate customer complaints and crusher damage.

HERE is another modern coal mine where Eriez Non-Electric Permanent Magnetic Pulleys are doing a three fold job. Coal is cleaned of tramp iron, thus eliminating customer complaints . . . crushing equipment is protected from damage . . . operating costs are sharply cut. This Eriez Pulley 24 inches in diameter by 30 inches in belt width is installed ahead of the crusher. Any tramp iron in the R.O.M. feed is automatically pulled out before coal can enter the preparation plant. The cost of the initial installation of magnetic protection was extremely low because no power conversion was necessary with Eriez Permanent Magnetic Pulleys. Also further operating and maintenance costs for magnetic separation were eliminated. The Eriez Pulley is non-electric . . . A package of powerful, permanent, magnetic energy which never decreases in strength. Ready for operation from the moment of installation, the first cost of Eriez Magnetic Protection is last cost. And in coal mine applications there's a bonus . . . Many drill bits and underground hand tools are recovered by Eriez Magnets. You can clean your coal of tramp iron and enjoy the same customer satisfaction with your product . . . Protect your expensive processing equipment from damage . . . cut operating costs all along the line by using Eriez Pulleys. 78 sizes from which to choose! *Complete data on capacities, dimensions and weights given in Bulletin 501A.*

CLIP AND MAIL TODAY CA6
Please send catalog No. 501A

We would like to know more about installation of ERIEZ on:

☐ Gravity Conveyors ☐ Mechanical Conveyors
☐ Equipment on processing Machines

COMPANY _____

Name _____

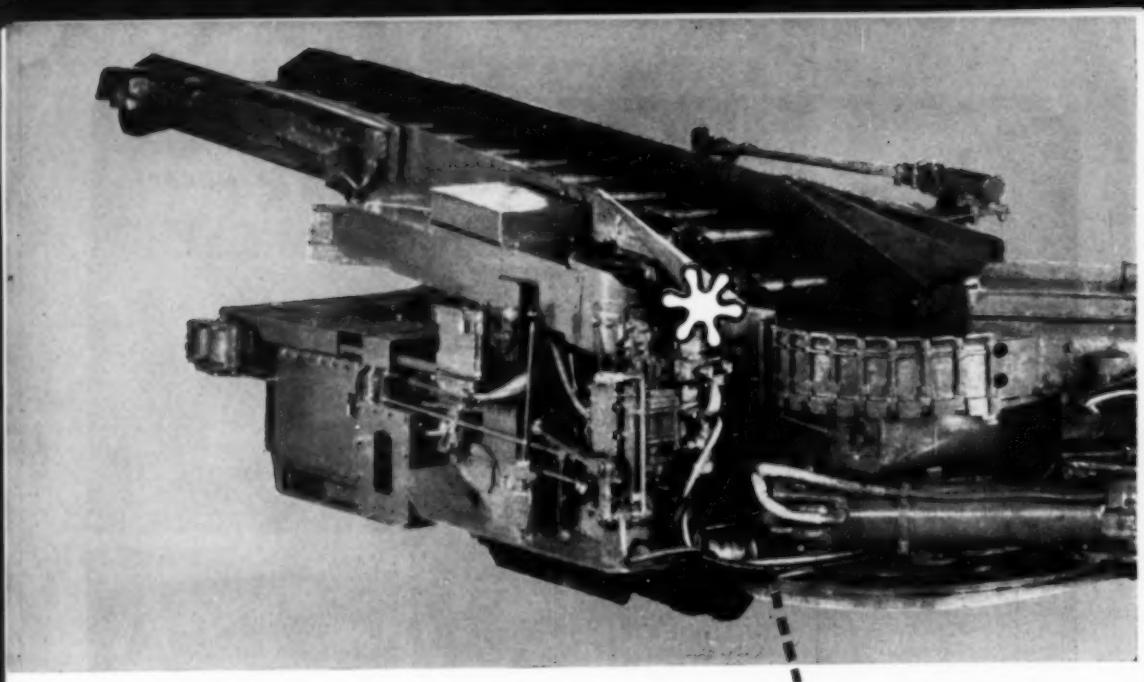
Address _____ City _____ State _____

When It's Magnetic Protection . . See Eriez First

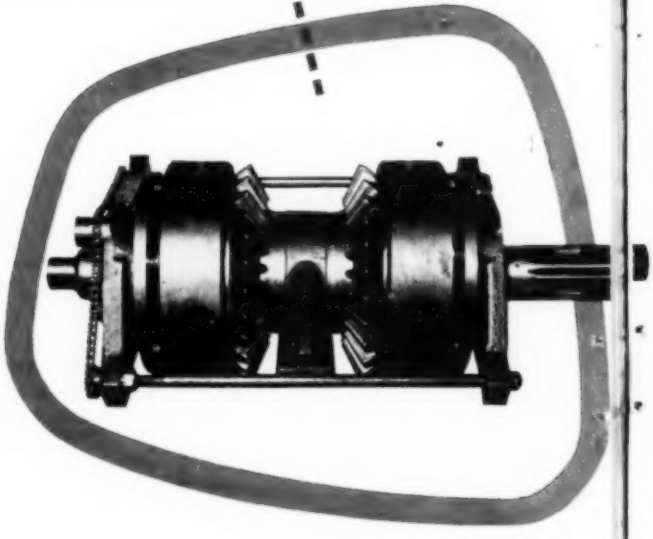
Pioneer of
PERMANENT
Magnetic Separation

ERIEZ MANUFACTURING COMPANY

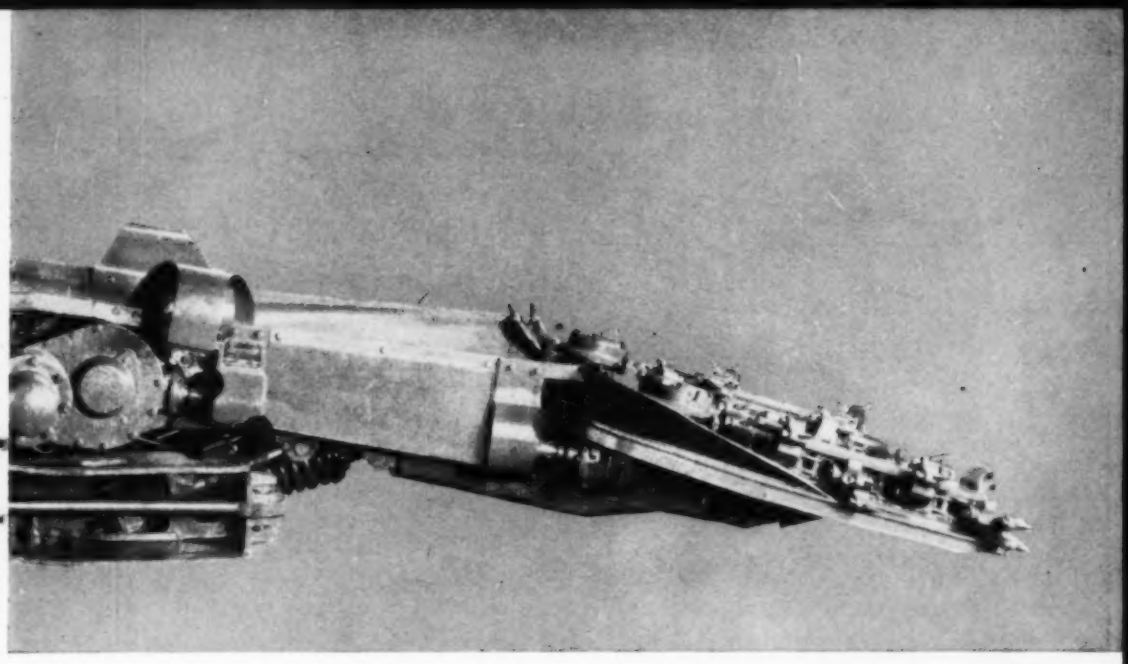
60 East 12th Street, Erie, Penna.



Get these savings in your clutches



STANDARD OIL COMPANY (INDIANA)



If you're looking for increased loader efficiency, don't overlook the importance of clutches. There is much evidence to prove that better clutch operation cuts maintenance costs and boosts tonnage. The evidence is equally clear that Superla Mine Lubricants contribute to efficient clutch operation in at least three important ways:

ELIMINATE WARM-UP TIME. Superla Mine Lubricants are fluid at low temperatures. When machines start, the lubricant readily flows over clutch plates. This eliminates drag, permits loading operations to be started immediately.

SHORTEN LOADING TIME. Superla Mine Lubricants keep clutch plates clean and free for action. This allows smooth operation of clutch controls. Machines can be handled more easily. Loading takes less time.

REDUCE REPAIR COSTS. Superla Mine Lubricants do not thin out excessively at machine-operating temperatures. This quality assures proper lubrication of clutches during long periods of continuous operation. Safer and cleaner lubrication keeps clutch maintenance at a minimum. Loaders stay on the job longer, load out more coal.

A trial of Superla Mine Lubricants in your equipment will prove their ability to make savings for you. Grades are available for both oil- and grease-lubricated loaders. Ask for the services of a Standard Oil Lubrication Engineer.

Write Standard Oil Company (Indiana), 910 South Michigan Avenue, Chicago 80, Illinois.

Superla
Mine Lubricants

STANDARD OIL COMPANY (INDIANA) STANDARD

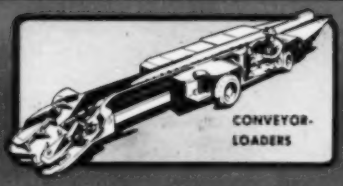
A Unique Type of Loader for Conveyor Mining

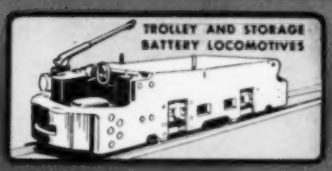
This loader demonstrates a unique principle which permits loading out all coal from the cut with the discharge point pivotally anchored above the room conveyor onto which it discharges. The fixed discharge point eliminates shuttling back and forth of entire machine between shot down coal and conveyor, thus eliminating spillage along the pan line.

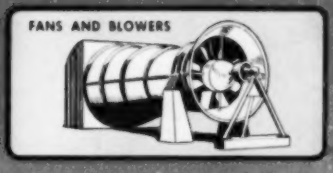
Easier and safer to operate as operator can concentrate on loading and forget about the discharge end. The extensible gathering head with its twelve-foot travel will reach all areas along the face of a thirty-five foot room.

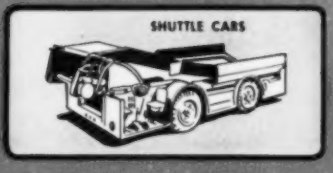
Hydraulic controls conveniently located, high loading capacity (1 to 1½ tons a minute in loose coal), low overall height of 24 inches and its maneuverability make the Jeffrey 61-CLR machine ideal for low coal operation and extremely economical in seams up to 48 inches high.

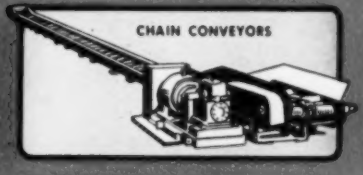
Consult a Jeffrey engineer on more economical equipment for your operation.

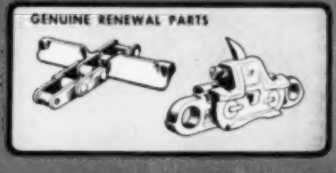












JEFFREY

EQUIPMENT FOR COAL MINES

and

GENUINE RENEWAL PARTS

THE JEFFREY MANUFACTURING COMPANY

Established 1877

General and Export Sales Offices

COLUMBUS 16, OHIO, U. S. A.

DISTRICT SALES OFFICES

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BIRMINGHAM 3 — 2210 Third Ave., N.
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FOREIGN PLANTS

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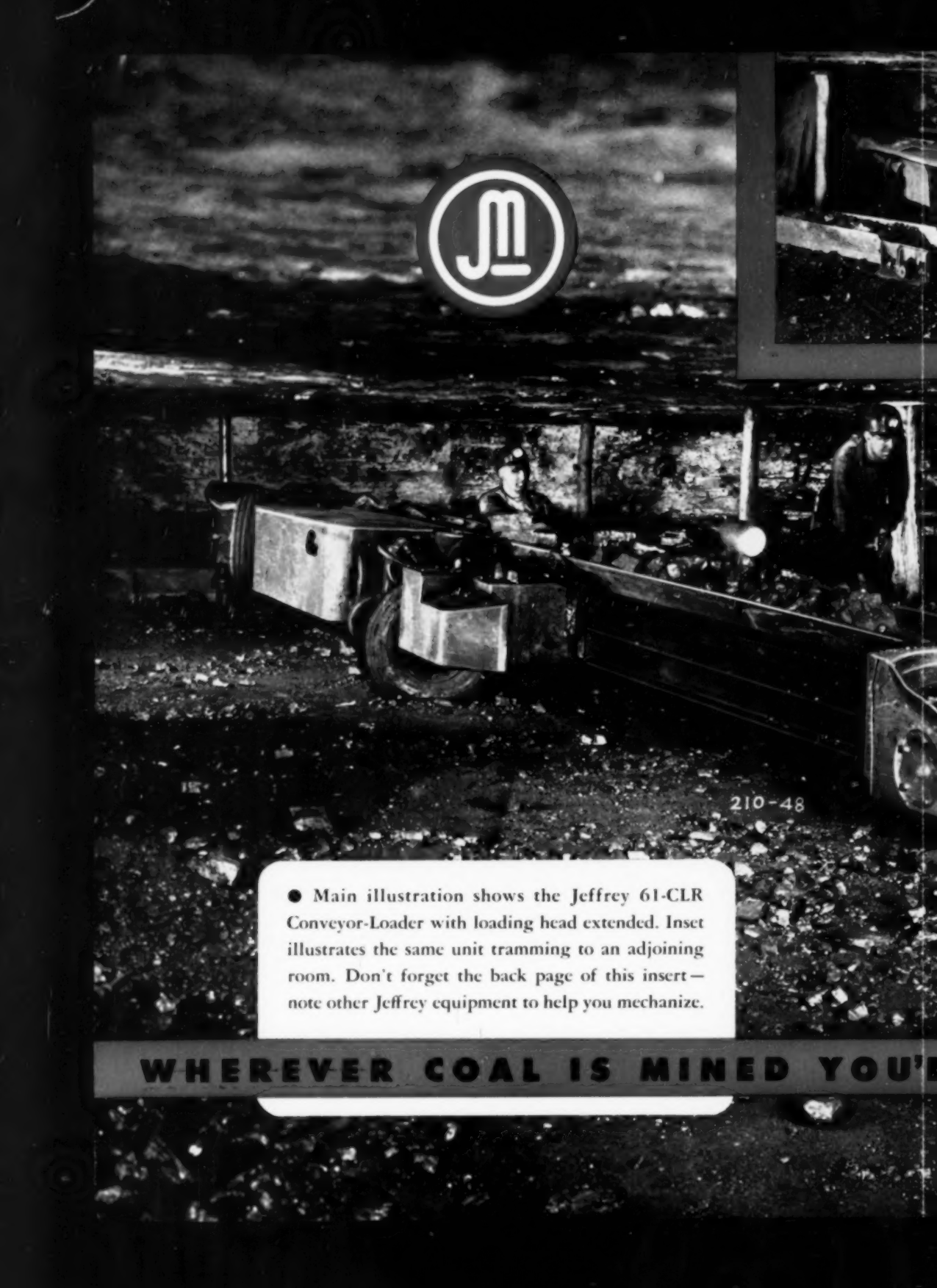
BRITISH JEFFREY-DIAMOND LTD., Wakefield, England
JEFFREY-GALION (PTY.) LTD., Johannesburg



● Main illustration shows the Jeffrey 61-CLR Conveyor-Loader with loading head extended. Inset illustrates the same unit tramming to an adjoining room. Don't forget the back page of this insert—note other Jeffrey equipment to help you mechanize.

WHEREVER COAL IS MINED YOU'

OU'LL FIND *JEFFREY* EQUIPMENT

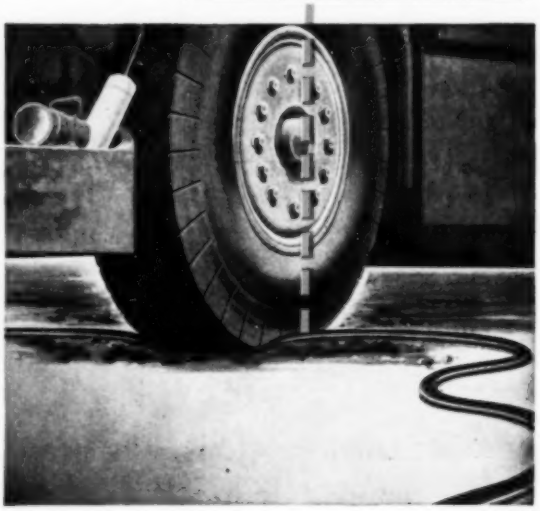
...permits

HEAVIER IMPACT

● Because of its patented Anti-Short Breaker Strip (available with or without ground wire) between conductors, Securityflex Parallel Mine Cable can withstand severe impacts with minimum danger of shorting. Adhesion between jacket and insulation —that makes a *solid block* around conductors—helps to give Securityflex its amazing crush-resistance. (Points that mean *greater safety* and *more tons per cable*.)

Other points of interest in Securityflex . . . neoprene jacket protects against flame, abrasion and tearing . . . engineered construction prevents kinking or twisting and stands up longer under extreme overloads . . . cable meets U. S. Bureau of Mines Flame Test and diameter specifications and Pennsylvania Flame Test.*

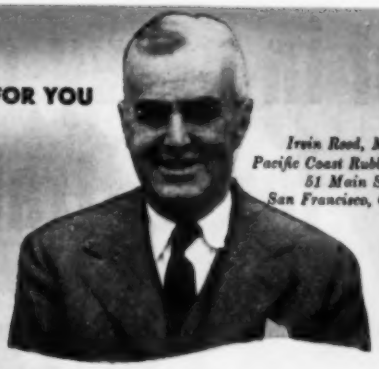
Specify Securityflex through your Anaconda distributor (all principal cities). Anaconda Wire & Cable Company, 25 Broadway, New York 4, N. Y.



*Insist on mark *of full compliance*—P-108-BM—at 12' intervals on any mine cable you buy.

ANACONDA *Securityflex* **MINE CABLE** ANACONDA

HERE'S WHAT REPUBLIC DISTRIBUTORS DO FOR YOU



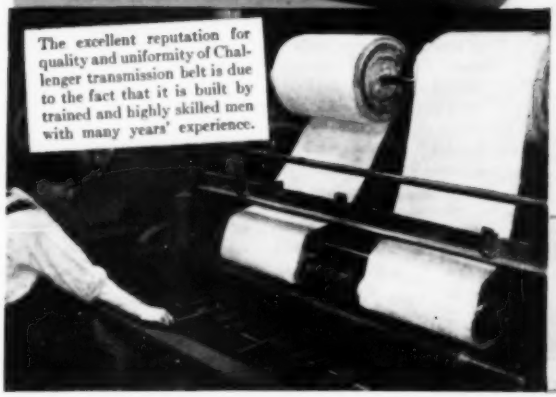
Irvin Reed, Manager
Pacific Coast Rubber Company
51 Main Street
San Francisco, California

CHALLENGER TRANSMISSION BELTING is tan in color with purple edges to identify it as a top performer on general services and heavy industrial drives under severe shocks and stresses. It has minimum stretch and freedom from fastner trouble. Made of heavy hard-woven fabric . . . (built and vulcanized under laboratory control).

How to avoid high cost when selecting transmission belting

★ Your distributor of industrial supplies will tell you that Challenger belting is breaking records on all types of industrial transmission drives.

There are no costly shut-downs due to application of the wrong type of belt. Experienced distributors such as Mr. Irvin Reed (pictured above) can help you choose the grade and type belting which will serve you best. And, there is a national network of Republic distributors to serve industry everywhere. If you feel you should be getting longer life from your belting, consult your telephone directory for the name of your Republic distributor, write or mail the coupon.



The excellent reputation for quality and uniformity of Challenger transmission belt is due to the fact that it is built by trained and highly skilled men with many years' experience.

REPUBLIC RUBBER DIVISION
Lee Rubber & Tire Corporation, Youngstown, Ohio
Lee Deluxe Tires & Tubes — Conshohocken, Pa.

MECHANICAL RUBBER GOODS BY
REPUBLIC RUBBER DIVISION

WHO REPRESENTS REPUBLIC IN MY AREA?
REPUBLIC RUBBER DIVISION · LEE RUBBER & TIRE CORP.
YOUNGSTOWN, OHIO

Name, title_____
Firm_____
Address_____
City_____ State_____

First in heavy-duty truck sales for 17 straight years!

America's most exacting truck buyers AGAIN give Internationals a vote of confidence!

Actual 1948 registration figures for new trucks of 16,001 pounds and greater GVW ratings show this nationwide preference for Internationals:

Internationals	**26.4%**
Truck "B"	**14.3%**
Truck "C"	**13.3%**

This marks the 17th successive year that Internationals have led in heavy-duty truck sales! Would men who buy on a basis of performance give a No. 1 rating to any truck unless it gave them a No. 1 value?

Outstanding value—right down the line! The same basic values that have kept Internationals first for 17 straight years in the heavy-duty field, are yours in any International Truck model. Heavy, light, or medium-duty, your International Truck is *all* truck. There's no compromise with passenger car design.

Trucks built to meet your requirements. Among the 22 basic International Truck models and 1,000 different truck combinations, there's a truck that's right for *your* job. In the range of gross weight ratings, from 4,400 to 90,000 pounds, you get the power, the frames, the axles you need for efficient hauling.

PLUS—the nation's largest exclusive truck service organization! 4,700 International Truck Dealers and 170 Company-owned Branches are ready with trained mechanics, precision-engineered replacement parts and low-cost rebuilt exchange units . . . ready to keep your International rolling at peak efficiency.

A truck transportation engineer is ready to help you! Call your nearest International Dealer or Branch, and find out how Internationals can step up the efficiency of your hauling. Trained International Truck transportation engineers will help you analyze your job—recommend a truck to lick it. If you're interested in profits, you'll call *soon!*

International Harvester Builds McCormick Farm Equipment . . . Farmall Tractors . . . Industrial Power
Motor Trucks . . . Refrigerators and Freezers

Tune in James Melton and "Harvest of Stars," NBC, Sunday afternoons

INTERNATIONAL TRUCKS

INTERNATIONAL HARVESTER COMPANY • CHICAGO

Why we so often recommend NO. 5's

Bethlehem No. 5 steel tie. Husky?—sure; but easy to handle and install.

It's no news to you that Bethlehem makes a full range of steel ties, and that we are glad to sell you any weight that best meets your requirements. But we might point out that we now often recommend the heavier ties, such as the No. 5's, even though we sell many thousands of the lighter ones each year.

The reason is that modern mechanized equipment necessarily puts heavy loads on the track structure. The weight of present-day cutters, loaders, and motors—not to mention the bigger cars so prevalent now—means that track must be built for heavy-duty service. Hence the larger steel ties are imperative in many cases.

Bethlehem's No. 5, 5 lb per ft, is designed specifically for 40-lb rail. It has proved over and over that it can bear today's loads without sagging, buckling, or bending. No. 5's have often been taken up and reused as many as 25 times.

This is a bulldog of a tie, and naturally it's a bit higher in first cost than the lighter weights. But its extra life will more than offset the difference in purchase price. Best evidence of this is the steadily increasing demand for No. 5's—especially in mines that for years employed the lighter ties.

Care for more details? A Bethlehem man will be glad to oblige.

BETHLEHEM STEEL

BETHLEHEM STEEL COMPANY, BETHLEHEM, PA.

On the Pacific Coast Bethlehem products are sold by Bethlehem Pacific Coast Steel Corporation

Export Distributor: Bethlehem Steel Export Corporation

YOUR MODERNIZATION'S COMPLETE

with new, heavy-duty mine cars

plus FULLY AUTOMATIC

YOU have to keep your new, large-capacity mine cars rolling to get out more coal at less cost. Old-fashioned link and pin couplings waste both time and man-power. To get full returns on your heavy investment in new equipment, you should complete your car modernization by installing O-B Automatic Couplers.

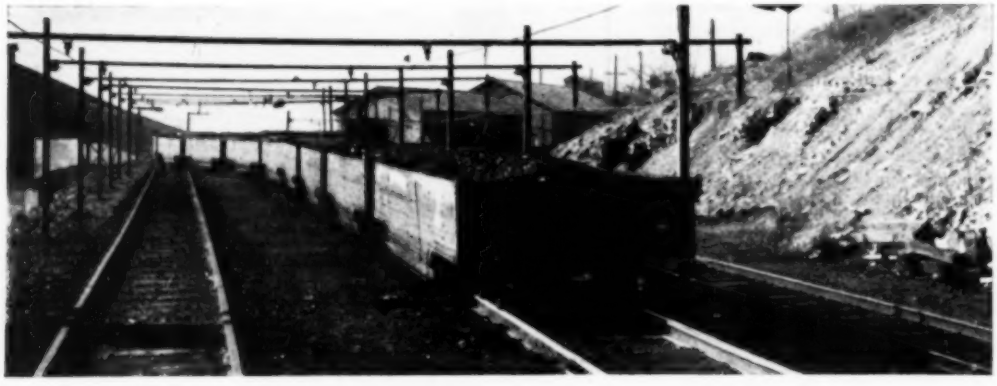
Here are the reasons why O-B Automatic Couplers can improve the over-all operating efficiency of your haulage system—and help you haul more coal for less money.

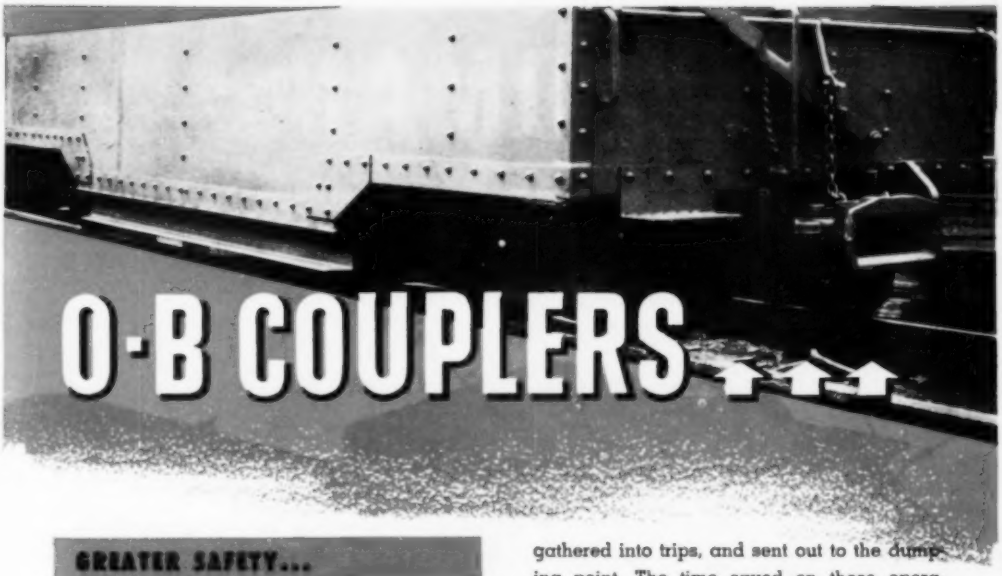
LESS MAINTENANCE...

O-B Automatic Couplers remove practically all dead slack from every trip. This eliminates car damage from jarring impacts and side strains which become increasingly severe as car weight goes up. Coupler-equipped cars spend little productive time in the repair shops for maintenance—they stay on the job.

INCREASED TRACK STABILITY...

Trips are kept in line on the track by the rigid steel-beam connections of O-B Couplers—permitting faster haulage speeds with little danger of derailments. The rubber draft gear of the Form-8 Coupler, with 100,000-lb. capacity, helps to keep the cars in the center of the track when pushing or buffing the trips.





GREATER SAFETY...

O-B Couplers eliminate the need for workmen to go between the cars for coupling or uncoupling. O-B's self-centering device brings the coupler heads to center position, making manual alignment of the couplers for positive connection unnecessary. The wide gathering range of the male and female design permits completely automatic coupling on all normal curves. Cars are easily uncoupled by a lever safely located at the side of the car.

FASTER OPERATION...

Cars can be brought in and out of the loading zone as soon as they are ready, quickly gathered into trips, and sent out to the dumping point. The time saved on these operations means more time for hauling coal. O-B Couplers for rotary dumping cars can be equipped with a rotary head, making uncoupling unnecessary at the dump—more time saved.

BIGGER PAY LOAD...

Cars equipped with O-B Automatic Couplers can be filled to capacity—and reach the tipple still at capacity. Jolting and banging—causing the coal to bounce out of the car—is kept to a minimum by the smooth, even ride given by an O-B Coupler-equipped trip.

When you are ordering your new mine cars, specify the couplers that will bring maximum efficiency to your haulage system. O-B Automatic Couplers will complete your mine car modernization.

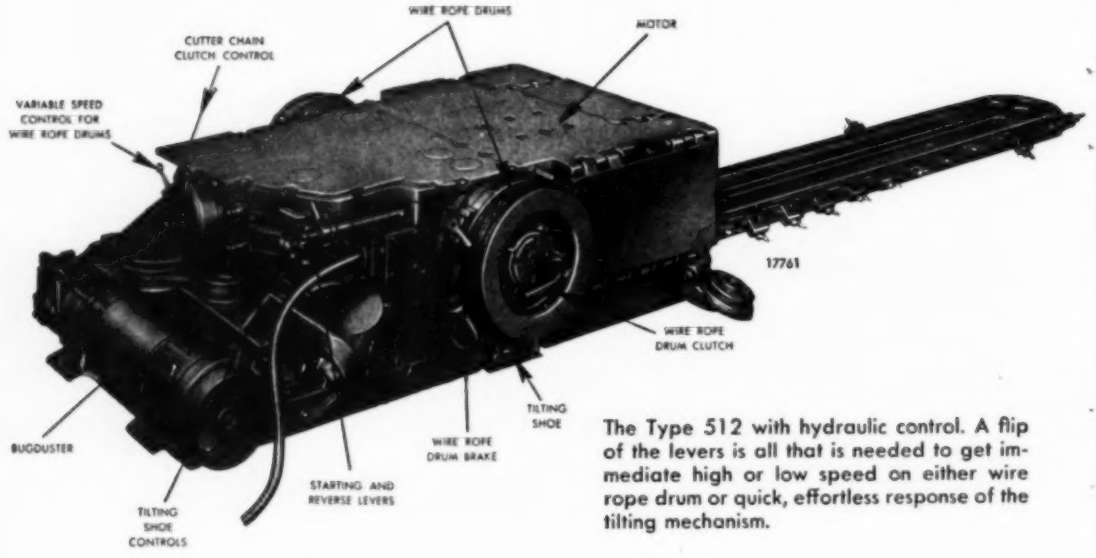
3023-AM

Ohio Brass

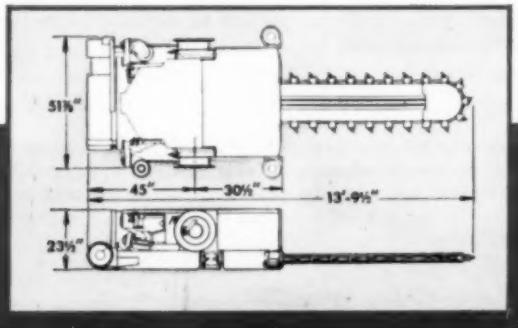
MANSFIELD, OHIO

Canadian Ohio Brass Co., Ltd.,
Niagara Falls, Ontario

The GOODMAN Type



The Type 512 with hydraulic control. A flip of the levers is all that is needed to get immediate high or low speed on either wire rope drum or quick, effortless response of the tilting mechanism.



A Goodman sales engineer will be glad to give you details of this popular machine. Ask him for a copy of new Bulletin CM-492.

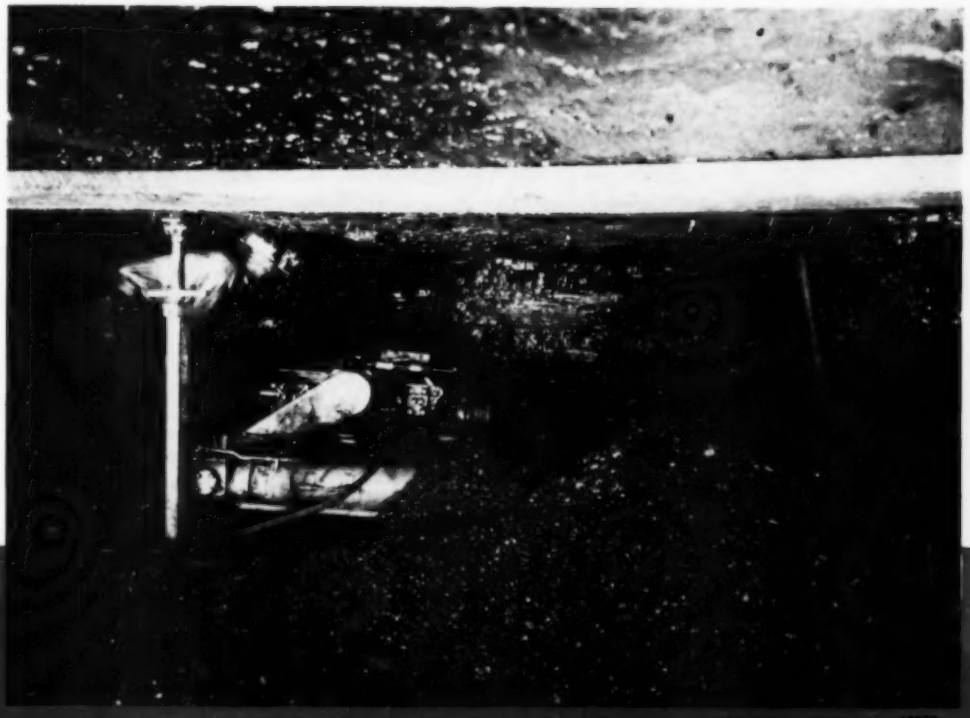
512 SHORTWALL

FAST CUTTING

LOW MAINTENANCE

EASY TO OPERATE

AUTOMATIC CONTROL OF BUGDUST



HALSTED ST. AT 48TH GOODMAN MANUFACTURING COMPANY CHICAGO 9, ILLINOIS

In Great Britain: The Eickington Engineering Company, Ltd.

BETHLEHEM STEEL

BETHLEHEM STEEL COMPANY, BETHLEHEM, PA.

On the Pacific Coast Bethlehem products are sold by
Bethlehem Pacific Coast Steel Corporation
Export Distributor: Bethlehem Steel Export Corporation

Other Bethlehem Fastenings for the Mine

SPIKES — TRACK BOLTS
RIVETS — SPECIALS
STANDARD BOLTS AND NUTS

7 Reasons why these YELLOW JACKET Cables mean Safety!

Trailing Cables have to be tough to withstand the flexing and twisting they must take while reeling in and out.

Seven grueling laboratory tests, all of them tougher than actual conditions, guarantee U. S. Royal's resistance to abrasion, cutting, heat, moisture, cold, impact—and its ability to stand constant flexing. The bright yellow color gives U. S. Royal Gold the highest visibility. To get your copy of the new U. S. Royal Gold descriptive folder write Electrical Wire and Cable Department, U. S. Rubber Company, Rockefeller Center, New York 20, N. Y.

SAFETY TESTED

Available in Black or the new Yellow Jacket

U.S.RUBBER
SERVING THROUGH SCIENCE

United States Rubber Company

U. S. ROYAL GOLD MINING MACHINE AND LOCOMOTIVE CABLES

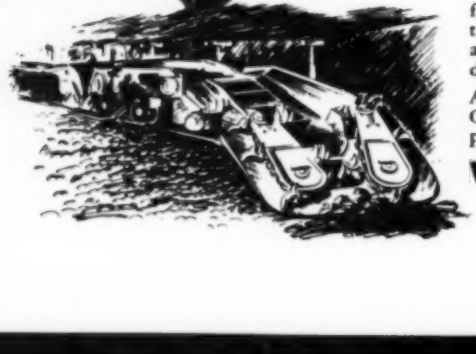
Here's the Evidence that Proves WHITNEY Universal Mining Chains Cut Operating Costs

UNIVERSAL JOINTS are constructed of steel forgings for toughness and workability. They are accurately machined for long life.

FLIGHT STUDS of alloy steel are fully machined and have milled threads. They are heat-treated for extreme toughness and durability.

END PINS of the universal joints are fully riveted into deep countersink in the forgings, providing maximum anchorage under all operating conditions.

LINK PARTS — plates, pins, bushings and rolls — are precision made from heat-treated alloy steel stock assuring long operating life with minimum maintenance.



Performance is the pay-off in any product . . . and in loaders it's keeping them up-at-the-face getting out coal that makes the revenue.

Whitney Universal Mining Chain will help your loader to keep producing by minimizing chain failures. Especially designed for this type of severe service, Whitney Chain gives you many features that cut chain costs. For instance, all link parts are made of tough, heat-treated alloy steel. Flight threads are fully machined with milled threads. The heavy heat-treated universal joints are alloy steel forgings accurately machined. End pins are fully riveted into deep countersinks providing maximum anchorage.

Anyway you look at it, Whitney Universal Mining Chain will help keep your loaders underground producing. See your distributor or write:

WHITNEY CHAIN & MFG. CO.
DIVISION OF WHITNEY-MANSON INDUSTRIES, INC.
210 Hamilton Street, Hartford 2, Conn.

One P&H after another

These two P&H Model 1400 Electric Shovels (4 cu. yard capacity) team up in this open pit mine at Tahawus, New York for the National Lead Company.

Yes, the new P&H Electric Shovels are following each other quickly these days — in one location after another. You'll find the reasons for it in P&H's Added Values.

"Magnetron" control is a typical example. Here, through the ingenious use of a proven magnetic principle within the controllers themselves, P&H has achieved stepless power regulation — smoother than you've ever known — for all motions in crowd, hoist, swing, and propel. What's more, multiple electrical contacts, resistor panels and separate exciters are entirely eliminated. And there are no terrific electrical surges to invite burn-outs and trouble.

Add to this, P&H's Magnetorque drive, independent propel, air-filtered cab and other outstanding advancements. Leadership in design means leadership in performance. Send for literature!

P&H Excavators are built in sizes from ½ to 6 cu. yds. — Gasoline, Diesel and Electric power.

P&H ELECTRIC SHOVELS
4540 West National Avenue
Milwaukee 14, Wisconsin

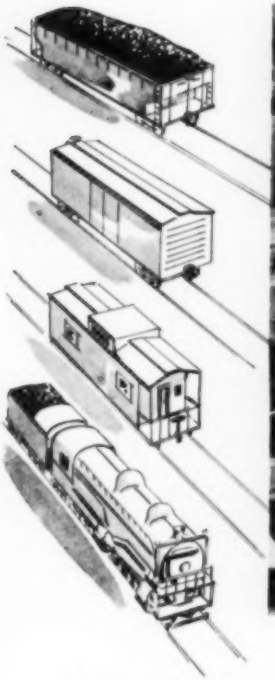
HARNISCHFEGER CORPORATION

Every Third P&H Electric Shovel Sold Is a Repeat Order

LEADING THE FIELD IN ELECTRIC SHOVEL DEVELOPMENT

OPERATIONS...PROGRESS!

$86,000,000 spent in 1948 for improvements



It may seem paradoxical, but a railroad never stands still. It must be always on the go . . . expanding, improving, adding. Its growth and development depend on all such operations.

Since 1946, when needed material became available, C&O's key mission was . . . Operations Progress! Each phase of the Chesapeake and Ohio Railway system was the beneficiary of this policy. During 1948, $86,000,000 was spent for additions and improvements to roadway and equipment. Branch lines were extended, new rolling stock acquired, miles of additional tracks installed, new yard and terminal facilities erected at Newport News, Va., plus a modern high capacity pier for handling tidewater coal now in the final stages of completion.

The net result may be summed up in a quote from C&O's President Walter J. Tuohy, in his Annual Letter to the Stockholders . . . "The improvement program is of great importance. It means that we will have what amounts to a re-made railroad, as fine a railroad plant as there is in the nation"

That is the target of Chesapeake and Ohio. Now in 1949, with the vast improvement program nearing completion, the C&O policy still calls for . . . Operations Progress!

C AND O FOR PROGRESS

CHESAPEAKE & OHIO RAILWAY

Largest Originating Carrier of Bituminous Coal in the World

Add Up the Savings with

Gulf Mining Machine Lubricant B

$ 1. lower maintenance costs

$ 2. reduced out-of-service time

$ 3. simplified lubrication storage and handling

$ _____ *your total savings*

1. Gulf Mining Machine Lubricant B eliminates lubricant throwoff and channeling, prevents the entrance of abrasive coal dust in gear cases, reduces wear, and resists the washing action of water. As a result, repair and replacement costs go down and stay down.

2. Improved lubrication with Gulf Mining Machine Lubricant B means fewer breakdowns, less time in the shop—which add up to greater tonnage.

3. With just this one lubricant—Gulf Mining Machine Lubricant B — you can do the entire lubricating job on most types of mining machines. Thus you eliminate 2 or 3 other lubricants, insure less confusion at the face, prevent application mistakes.

To get the many benefits possible with this quality lubricant, and for expert help on other phases of improved lubrication, call in a Gulf Lubrication Engineer.

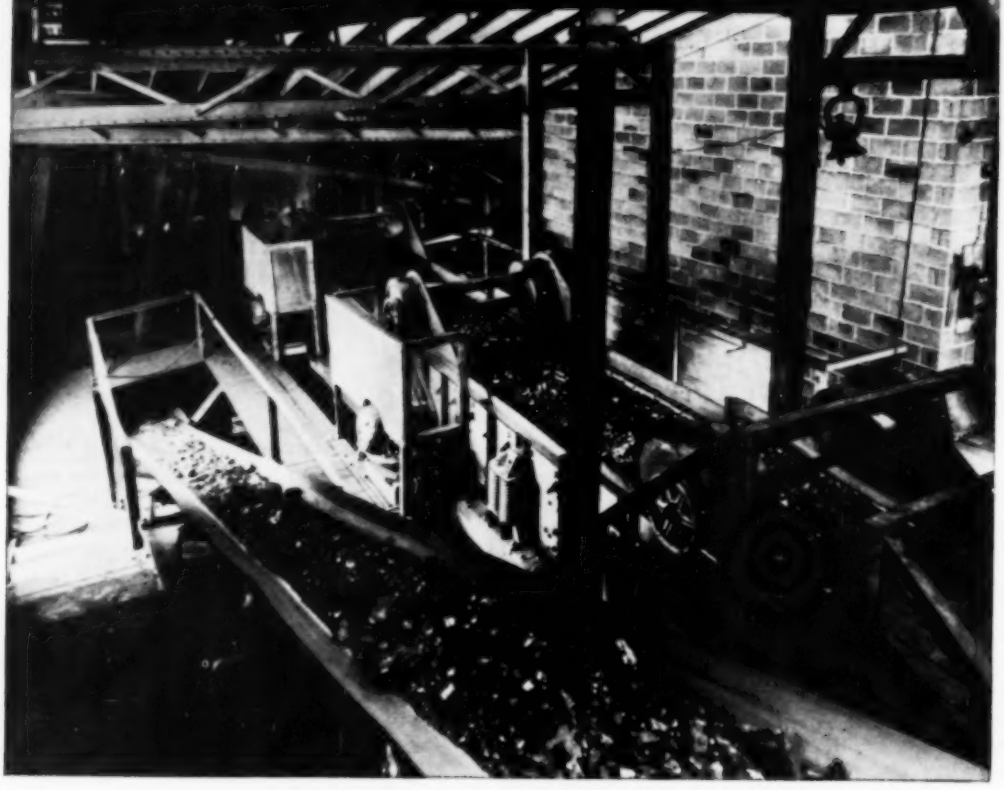
GULF INDUSTRIAL LUBRICATION

Gulf Oil Corporation · Gulf Refining Company

Division Sales Offices: Boston · New York · Philadelphia · Pittsburgh · Atlanta · New Orleans · Houston · Louisville · Toledo

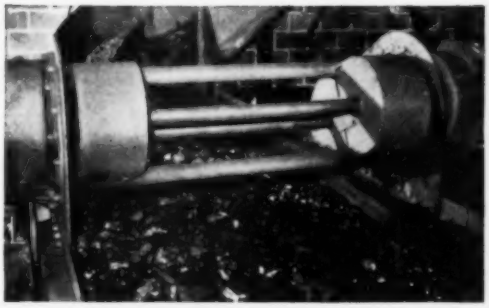
How a mechanized tipple turns out cleaner, more uniform coal

HEWITT-ROBINS COAL-HANDLING SYSTEM ENABLES LECKIE SMOKELESS COAL COMPANY TO KEEP COAL PROCESSING IN PERFECT STEP WITH HIGH PRODUCTION



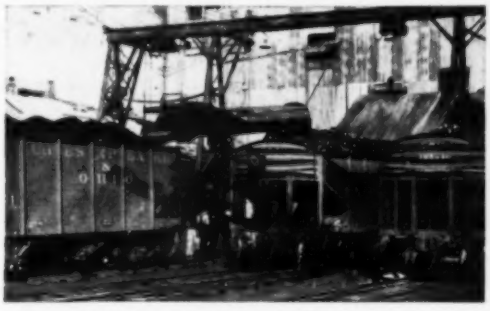
At the rate of 2,500 tons per day. The Leckie Smokeless Coal Company benefits by modern belt conveyors from start to finish in its Anjean, W. Va., operation. A Hewitt-Robins Mine Conveyor moves coal out of the mine quickly and economically. The Hewitt-Robins Conveyor shown here carries coal up to the pre-sizing screen ahead of the washing equipment.

HEWITT-ROBINS COMPLETE COAL-HANDLING SYSTEMS

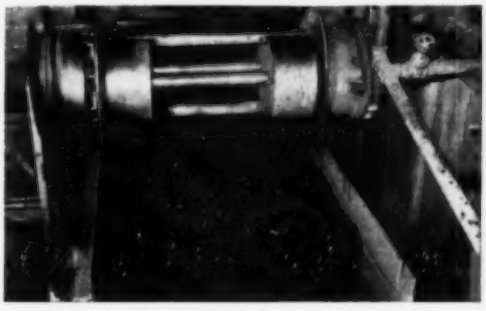


Dry fines removed here. Incoming coal is discharged by conveyor onto this Hewitt-Robins Eliptex Screen. Fines of ⅛" or less are shaken out and quickly moved by conveyor to waiting railroad cars.

Automatically washed and dried. Coal larger than ¼" passes to a mechanical washer for thorough cleaning. Then this battery of Hewitt-Robins Eliptex Dewaterizers shakes out virtually all moisture.



Sized coal conveyed to cars. The dewatered coal is mechanically separated by size and is loaded—according to size—by Hewitt-Robins Boom Conveyor into railroad cars.



Valuable fines recovered from sludge. Meanwhile, another Hewitt-Robins Eliptex Dewaterizer recovers valuable coal particles from the sludge. It saves thousands of tons of these fines each year!

You can find your answer here, too!

Whatever your coal-handling problem, you can get the answer from Hewitt-Robins.

Through their use of modern Hewitt-Robins coal-handling equipment, hundreds of operators are marketing cleaner, more uniform coal. Furthermore, they are handling that coal swiftly, surely and economically.

Here's just one example of how Hewitt-Robins stands ready to serve you. Three types of Hewitt-Robins Mine Conveyors—machinery and belt—are now carried *in stock* in 26", 30" and 36" widths so you can take *immediate delivery* from Charleston, W. Va., or Passaic, N. J.

Whether you need a single vibrating screen, a mine conveyor or a complete coal-handling system, depend on Hewitt-Robins.

THESE DIVISIONS OF HEWITT-ROBINS SERVE THE COAL INDUSTRY

Hewitt Rubber Division

Through the manufacture of water hose, air hose, water suction hose, and coal conveyor belting.

Robins Conveyors Division

Through the manufacture of conveyors, idlers, vibrating screens, cloth, dewaterizers, and car shakeouts.

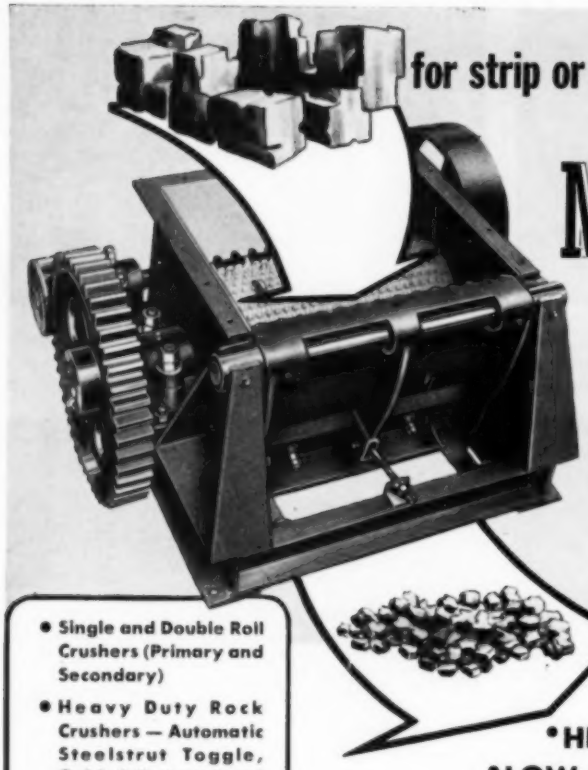
Robins Engineers

By designing, furnishing and installing complete coal-handling systems.

HR **HEWITT ROBINS INCORPORATED**

[illegible] DIVISION, BUFFALO 5, NEW YORK
[illegible] YORS DIVISION, PASSAIC, NEW JERSEY
[illegible] NEERS, NEW YORK CITY 7, NEW YORK

for strip or underground operations...



McLANAHAN

Bantam Buster

SINGLE ROLL

CRUSHERS

- Single and Double Roll Crushers (Primary and Secondary)
- Heavy Duty Rock Crushers — Automatic Steelstrut Toggle, Quick Adjustment and Pioneer series
- Double Roll Fabricated Steel Crushers
- Jaw Crushers
- Portable and Semi-Portable Crushing Plants
- Dry Pans Super Heavy Duty
- Conveyors
- Dryers of Revolving Type
- Elevators
- Feeders
- Hoists
- Ore Jigs
- Screens
- Washers & Scrubbers
- Special Machinery and Complete Plants

•HIGH-RATIO REDUCTION
•LOW INITIAL COST
•TROUBLE-FREE MAINTENANCE
•PORTABLE—Self-contained units

The McLanahan Bantam Buster Fabricated Steel frame crushers answer the need for a dependable, low cost machine that does the job with minimum operating and maintenance expenses. These rugged, high-ratio crushers take a larger feed than equivalent crushers. They easily crush different size feeds of hard and soft coal to various size products.

Available in many sizes 18" diameter up to 42" wide, and 24" and 30" diameters up to 48" wide. They are adaptable for most any installations. The crushing plate is hinged to permit different adjustments; alemite lubricated babbitted or roller bearings carry the roll and counter-shafts. Safety adjusting. Write for descriptive technical bulletins.

Headquarters for Pit, Mine and Quarry *Modernization*

McLANAHAN and STONE Corp.

HOLLIDAYSBURG, PA.

Since 1835

JOY

The Pioneer in Mechanized Mining

FIRST AGAIN WITH THE CONTINUOUS MINER

(TWO MODELS: HIGH AND LOW COAL)

Write for Bulletin, or *Consult a Joy Engineer*

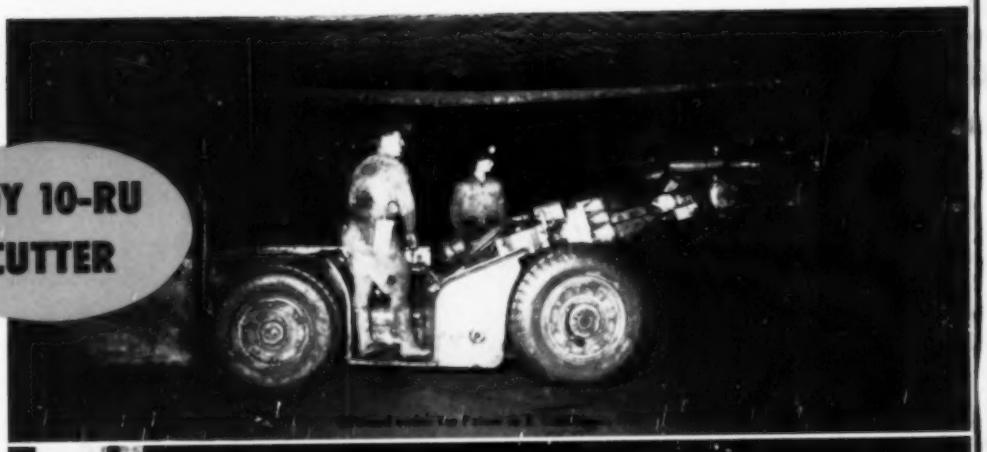
WAD CL2514

JOY MANUFACTURING COMPANY

GENERAL OFFICES: HENRY W. OLIVER BUILDING · PITTSBURGH 22, PA.

IN CANADA: JOY MANUFACTURING COMPANY (CANADA) LIMITED, GALT, ONTARIO

MECHANIZE



JOY 10-RU CUTTER

JOY 11-BU LOADER

JOY 10-SC SHUTTLE CAR

with JOY CUTTERS, LOADERS and SHUTTLE CARS

JOY–and only **JOY**–offers you a complete line of equipment to meet every coal-mining condition... a line in which every machine is *FIELD-PROVED in SERVICE*

★ *Proved for Dependability!*
★ *Proved for Results!*

WOD CL2512

Write for Bulletins, or *Consult a Joy Engineer*

JOY MANUFACTURING COMPANY

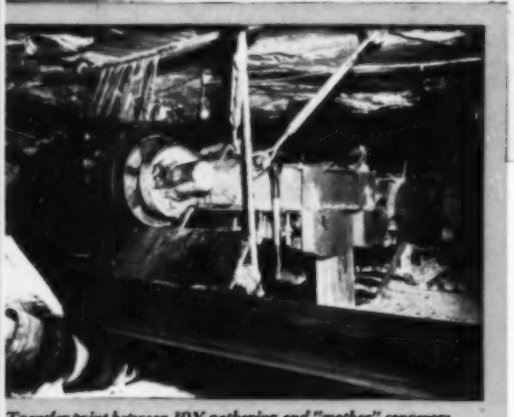
GENERAL OFFICES: HENRY W. OLIVER BUILDING · PITTSBURGH 22, PA.

IN CANADA: JOY MANUFACTURING COMPANY (CANADA) LIMITED, GALT, ONTARIO

JOY BELT CONVEYORS

YOUR BEST BET IN THE LONG HAUL!

A modern JOY Belt Conveyor is the efficient main haulage in this mine.



Transfer point between JOY gathering and "mother" conveyors.

★ Designed for LOW MAINTENANCE

★ Built for LONG LIFE

★ Proved for RELIABILITY

For gathering or main haulage systems, you'll find JOY Belt Conveyors most efficient in providing a smooth, continuous flow of coal at minimum cost, and with greatest dependability. Rugged construction and sealed-for-life idler bearings, requiring no lubrication, assure trouble-free operation with low power consumption and the least possible maintenance cost or shut-down time. ● JOY builds a conveyor—belt, chain or shaker—for *every* mining condition. *Write for Bulletins,* or for engineering assistance.

Consult a Joy Engineer

W&D CL2200

JOY MANUFACTURING COMPANY

GENERAL OFFICES: HENRY W. OLIVER BUILDING · PITTSBURGH 22, PA.

IN CANADA: JOY MANUFACTURING COMPANY (CANADA) LIMITED, GALT, ONTARIO

Photo taken in Southern Illinois coal fields by William Vandivert

Offhand you might suppose that this huge tube is a factory smokestack. But it's really a spare "spoon handle" for a giant shovel used in surface coal mining. This big boom carries a price tag of $12,500—which is a lot of money for a spare part. Yet if one such boom should fail, it would take over eight weeks to build a new one—tying up for the entire period a shovel costing more than $650,000!

Mechanized mining calls for immense capital expenditures. A medium-sized loading machine now costs about $20,000, a 6-ton electric shuttle buggy about $12,000, and some mobile cutting machines cost as much as $28,000, while the building and equipment of a modern preparation plant is a million-dollar project. Some large ones built since the war have represented an outlay of as much as $7,000,000 each!

Today the progressive coal industry is carrying on a billion-dollar mechanization program—designed to raise mine output of quality coal while keeping pace with the nation's increasing coal requirements.

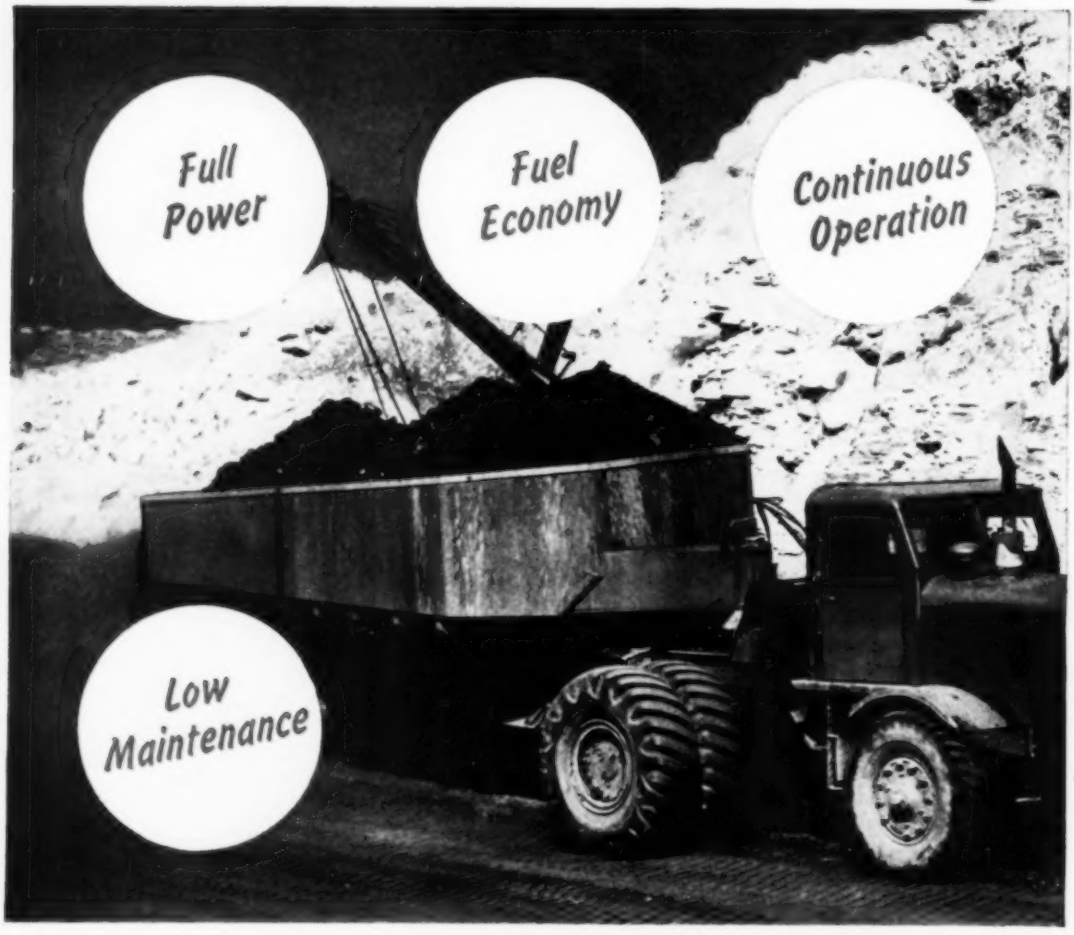
Better tools and working conditions for coal miners are matched by improvements in living conditions.

Today, almost two-thirds—more than 260,000—of the nation's bituminous coal miners either rent from private landlords or own their own homes, and home ownership among miners generally is on the increase. This is good for families and their companies alike. It gives to the miner the greater satisfaction and security that come with living in a "home of his own," and it frees management and capital for the big job of getting maximum coal production at the lowest possible cost.

BITUMINOUS COAL
BITUMINOUS COAL INSTITUTE
A DEPARTMENT OF NATIONAL COAL ASSOCIATION
WASHINGTON, D. C.

BITUMINOUS COAL . . . LIGHTS THE WAY . . . FUELS THE FIRES . . . POWERS THE PROGRESS OF AMERICA

SINCLAIR TENOL of Maintaining



SINCLAIR

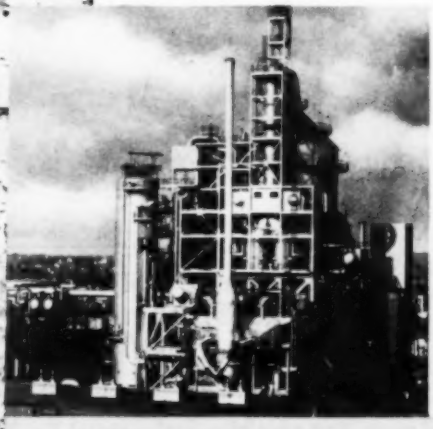
YOUR NEAREST SUPPLIER OF SINCLAIR PRODUCTS WILL GLADLY ARRANGE

Solves the Problems Full-Time Operation

Every operator has before him four big objectives. He requires Full Power from the engine and Low Fuel Consumption. He wants Uninterrupted Operation and Low Maintenance. When Sinclair TENOL is the lubricant, the operator can accomplish all these aims.

TENOL retards oxidation effects and reduces gum, varnish, and engine deposits to ward off valve sticking and thus promotes full power output. Combustion compounds, unburned fuel, carbon and soot, resins, dust and dirt remain suspended and are carried away in the oil draining. They do not accumulate as sludge to cause sticking and clogging.

TENOL helps maintain top production continuously . . . giving full power every hour in every day.



New Fluid Catalytic Cracking Stills (like the one shown here) are helping to expand Sinclair's refinery output. Sinclair's great refineries are now turning out products at the rate of 150,000,000 gallons of lubricating oil yearly.

About 40% of all the Aircraft Engine Oil used by domestic Airlines in the U.S.A. is supplied by SINCLAIR. The same careful research that developed this high quality oil for the Airlines is put into TENOL and other Sinclair Oils.

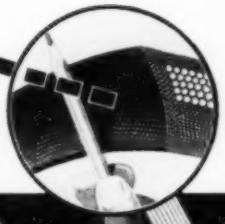
HEAVY DUTY LUBRICANTS

FOR LUBRICATION COUNSEL, OR YOU MAY WRITE TO SINCLAIR REFINING COMPANY, 630 FIFTH AVE., NEW YORK 20, N. Y.

This Simple Test
Shows Exactly How

The CONCAVE SIDE...
(U.S. Patent No. 1813698)

Saves You Money!



Pick up *any* V-belt having the ordinary straight sides and *bend* the belt. Three things will happen, right before your eyes.

(1) The top of the belt is under tension and grows *narrower*. (2) The body, under compression, becomes wider. (3) The sides of the belt *bulge out*. (Figures 1 and 1-A, below.)

Straight-Sided V-Belt

How Straight-Sided V-Belt Bulges in Sheave-Groove

This bulging of the straight-sided V-belt in its sheave-groove costs you money in *two* ways—(1) The bulge causes uneven sidewall wear—*shorter life!* (2) The bulging side cannot evenly grip the wall of the sheave groove—a loss in *transmission efficiency!*

In figures 2 and 2-A, you see how the precisely engineered *concave* side of the Gates Vulco Rope exactly corrects this bulging.

Gates Vulco Rope with Concave Side.

No Side Bulge Precise Fit in Sheave-Groove.

Two distinct *savings* result. (1) The Gates Vulco Rope wears evenly—*longer life!* (2) The entire side-wall grips the pulley—carries heavier loads and *sudden load increases* without slippage:—saves *belts* and also *saves power!*

The Mark of SPECIALIZED Research

The Concave Side is *MORE IMPORTANT NOW* Than Ever Before

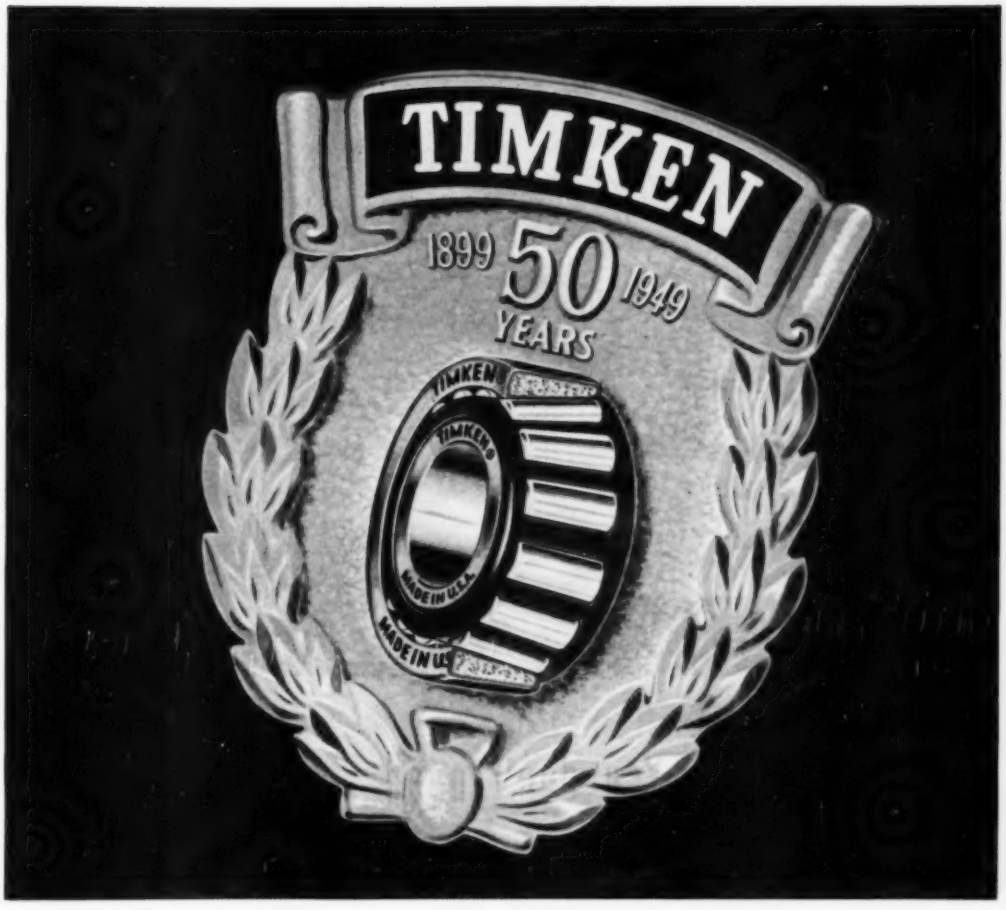
Because the sides of a V-Belt are what actually drive the pulley, it is clear that any increased load on the belt means a heavier load that must be transmitted to the pulley directly through the belt's sidewalls.

Now that Gates *SPECIALIZED* Research has made available to you SUPER Vulco Ropes—carrying fully 40% higher horsepower ratings—the life-prolonging Concave Side is naturally more important in conserving belt life today than ever before.

498

GATES VULCO ROPE DRIVES
IN ALL INDUSTRIAL CENTERS

THE GATES RUBBER COMPANY
DENVER, U.S.A.
The World's Largest Makers of V-Belts



50th birthday of the company whose products you know by the trade-mark: TIMKEN

SINCE 1899 THE TIMKEN ROLLER BEARING COMPANY HAS BEEN HELPING AMERICAN INDUSTRY GET THE MOST FOR ITS MONEY

NOBODY likes to buy a "pig in a poke". In America you don't have to. You're protected by trade-marks like "TIMKEN".

Registered as a trade-mark in the United States Patent Office, "TIMKEN" identifies products made by The Timken Roller Bearing Company: Timken tapered roller bearings, Timken alloy steels and seamless tubing and Timken removable rock bits.

Experience over the years has shown Timken products to be the finest in their respective fields. And many thousands of men and women are working hard to keep them that way. No wonder it has become a habit throughout industry to look for the trade-mark "TIMKEN". The Timken Roller Bearing Company, Canton 6, Ohio. Cable address: "TIMROSCO".

You don't need a buyer's market to cut this high cost! You can act NOW!

Your other high costs may or may not be "leveling off" but high eye accident costs are a tax no management need put up with.

Eyes are COSTLY targets when hit by particles that injure and blind. The average cost of a minor eye accident is over seven times the average cost of the goggle that would have prevented the injury. The ECONOMY of this protection is self-evident when it is realized that the cost of the goggle represents far less than two hours lost in productive time of the worker.*

Ask your nearest MSA Representative to show you how an adequate eye protection program *works* and how much it *saves*.

*Average price of goggles $2.30. Estimated 1949 average hourly earnings of factory workers $1.41 (Source: U.S. News)

American Optical COMPANY — Safety Products Division

Southbridge, Massachusetts
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Need Alloy Steels?

TRY US FIRST!

When you come to us for alloy steels, you're sure of three things: (1) Prompt attention to your orders; (2) your alloy steels are manufactured to a *Guaranteed Minimum Hardenability*; (3) you get an additional metallurgical service in the form of a Heat Treatment Guide with each shipment. And this guide gives you specific data on the composition, potential physical properties and recommended heat treatment temperatures to help you get the maximum performance from the U·S·S Carilloy Steels we supply on your orders.

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USS

UNITED STATES STEEL

MAKES MORE $ FOR MORE MINES

than any other kind

The largest selling bits for use with mechanical coal cutting machines are Bowdil Bits. Such popularity is deserved by performance, long life and low cost operation in a growing list of mines throughout the world.

Made of special alloy steel and heat treated by the most modern methods to hardnesses best suited to your cutting conditions, Bowdil Bits are available in special shapes, cutting face contours and clearance angles to fit your needs.

A nearby Bowdil Service Man or Representative will be pleased to give you further information. Write for our latest bulletins on Bowdil Mining products.

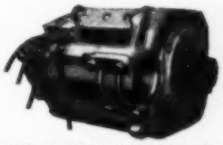
BOWDIL

COAL CUTTING EQUIPMENT

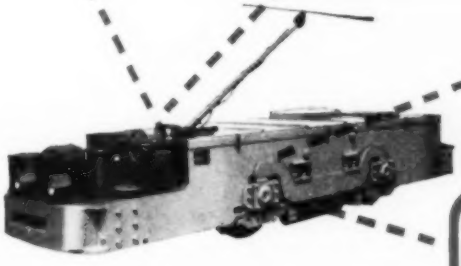
CANTON OHIO

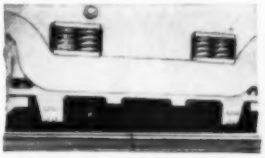
CONVENIENTLY LOCATED air brake valve controls application of air to two equalized brake cylinders. A motor-driven compressor maintains pressure in the reservoirs.

FOR EMERGENCY APPLICATION, and to hold locomotive at rest, standard G-E handbrakes are built to last. Above, precision-built brake rigging and hand-wheel.



YOU GET SMOOTH CONTROL of train speed by dynamic braking. Operator fatigue is also reduced. Above, a G-E Traction D-c motor, heart of the dynamic braking system.





AN ADDITIONAL SAFETY FEATURE is provided by the supplemental magnetic track brakes which give sure, positive "grip" on tracks for final braking.

on G-E trolley-type locomotives

4 WAY BRAKING SAFETY

Air brakes
Hand brakes
Dynamic brakes
Magnetic track brakes

To minimize chances of accident, personnel injury and equipment damage, and to lessen chances of production slowdowns, a four-way braking system is now offered on General Electric trolley-type mine locomotives—a system that operates *regardless* of main power failure or off-wire trolleys.

Besides standard mechanical hand brakes, this system includes air brakes, *plus* easy-to-handle dynamic brakes, and magnetic type track brakes. A 32-volt battery, which is automatically maintained by a motor-generator set with voltage regulator, can energize either the dynamic or magnetic braking system, independent of trolley power.

A G-E specialist in mine locomotives will be glad to give you complete information. Call your local G-E office today! ***Apparatus Department, General Electric Company, Schenectady, New York.***

FOR SAFER SERVICE—G-E MINE LOCOMOTIVES

GENERAL ELECTRIC

WALWORTH LUBRICATED PLUG VALVES

offer these advantages

- . . . Direct port opening
- . . . Quarter turn opens or closes valve
- . . . Dead tight shut-off
- . . . Freedom from attack by fluids being handled
- . . . Pressure sealed
- . . . Made in a complete line. Sizes from ⅛" to 24" for pressures from 175 to 5,000 psi., and for vacuum requirements

THESE are just a few of the reasons why Walworth Lubricated Plug Valves give "top" performance on many *difficult* services.

All Walworth Lubricated Plug Valves employ special insoluble lubricants which protect the plug and body against contact with the line fluid, thus combatting erosion and corrosion.

The lapped surfaces of the valve are "pressure sealed" when the valve is in either the open or closed position. By turning the lubricant screw, lubricant is forced under high pressure through a grooving system that completely encircles the ports as well as the top and bottom of the plug.

The lubricant seals the valve against leakage, and reduces friction between plug and body. This permits easy, quick, full-opening, or tight shut-off with only a quarter turn of the plug.

Number 1700 (illustrated) is a Steel-iron valve, wrench operated, designed for a working pressure of 200 pounds WOG (water, oil, or gas). Valves are available in either screwed or flange types. Screwed type have API line pipe thread lengths. Flanged type (No. 1700F) is faced and drilled to American Standard for 125-pound cast iron flanges unless otherwise specified.

For further information about No. 1700 as well as the complete line of Walworth Lubricated Plug Valves, write for catalog.

WALWORTH

valves and fittings

60 EAST 42nd STREET, NEW YORK 17, N. Y.

JR ROEBLING

TOUGH JACKETS

THAT BRING LONG WEAR AND SAVINGS

BEST . . . ABOVE OR BELOW GROUND!

BATTERED AND ABUSED . . . dragged over rough surfaces, through water and grease . . . Roebling Roeprene Mining Machine Cables take everything that comes and stay dependably on the job. They're extra tough because Roebling puts extras into their manufacture . . . careful lead-mold curing, for instance, that makes their Roeprene jackets extremely dense and resilient.

Roebling Roeprene Mining Machine Cables are furnished in two-conductor concentric; two-conductor flat; and two or more conductors in round construction. The two latter constructions are available without ground wires (Type W) or with ground wires (Type G). All are approved by the Pennsylvania Bureau of Mines, Approval P-111.

Ask your Roebling Distributor to help choose the *right* portable power cable for top efficiency and economy. John A. Roebling's Sons Company, Trenton 2, New Jersey.

WRITE OR CALL THE ROEBLING FIELD MAN AT YOUR NEAREST ROEBLING OFFICE AND WAREHOUSE

Atlanta, 934 Avon Ave. ★ ***Boston,*** 51 Sleeper St. ★ ***Chicago,*** 5525 W. Roosevelt Rd. ★ ***Cleveland,*** 701 St. Clair Ave., N. E. ★ ***Denver,*** 1635 17th St. ★ ***Houston,*** 6216 Navigation Blvd. ★ ***Los Angeles,*** 216 S. Alameda St. ★ ***New York,*** 19 Rector St. ★ ***Philadelphia,*** 12 S. 12th St. ★ ***Pittsburgh,*** 455 W. North Ave. ★ ***Portland, Ore.,*** 1032 N. W. 14th Ave. ★ ***San Francisco,*** 1740 17th St. ★ ***Seattle,*** 900 First Ave.

ROEBLING

☆ A CENTURY OF CONFIDENCE ☆

COST PER UNIT OF WORK LOW COST
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LOW COST PER UNIT OF WORK LOW

The article with the lowest price tag can be tempting, can look like a bargain. Yet another brand, with a higher first cost, may be far more economical in the end — because of the longer, better service it gives.

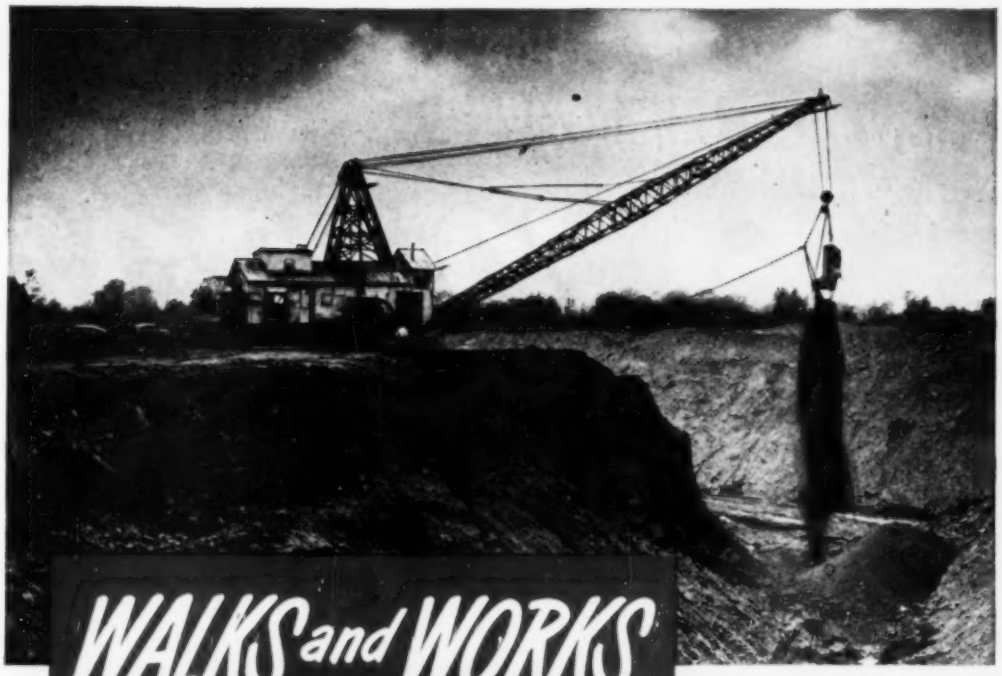
You may find sometimes that Bethlehem wire rope is a bit higher in first cost than some other brand; but on the basis of long-range economy — *true* economy — we invite you to compare it with anybody's product, any place, any time.

Bethlehem has one of the finest, most modern rope mills in the world; a staff of engineers whose sole object is to build longer life and better service into Bethlehem ropes; and a field organization whose job is to study rope trends and rope uses in every industry. All this adds up to one thing — quality; the type of quality that in wire rope means Lower Cost per Unit of Work.

And that's the only real yardstick — the only *real* measure of economy.

BETHLEHEM STEEL COMPANY
BETHLEHEM, PA.

On the Pacific Coast Bethlehem products are sold by Bethlehem Pacific Coast Steel Corporation
Export Distributor: Bethlehem Steel Export Corporation



WALKS and WORKS 25% FASTER

G & F Corporation's 5-yd. dragline, powered with a General Motors Series 71 Diesel "Twin 6," literally walks away with this big job—stripping 6000 yards of overburden every 24 hours.

THIS Bucyrus-Monighan 5-yd. "walking" dragline had a cumbersome old-fashioned Diesel engine. Then a General Motors Diesel took its place. Right off the bat, production went up 25%—maintenance costs nose-dived.

The reason? GM Diesels are 2-cycle—give plenty of rugged power in units that are moderate in size and weight, easy to start on their own fuel and quick and simple to maintain.

Another feature is the way the basic Series 71 engines can be built into multiple engine units. In addition to single engines, two four-cylinder or two six-cylinder engines are offered as "Twins" and four "sixes" are compounded into a "Quad." A wide choice of reduction gears are available for all, making them applicable to every installation.

If you have tough jobs where dependable low-cost power is a *must*, better get all the facts about these versatile 2-cycle Diesels. See them at your GM Diesel distributor's or drop us a line.

DETROIT DIESEL ENGINE DIVISION

SINGLE ENGINES... Up to 300 H.P. DETROIT 28, MICHIGAN MULTIPLE UNITS... Up to 600 H.P.

GENERAL MOTORS

GM GENERAL MOTORS DIESEL POWER

DIESEL BRAWN WITHOUT THE BULK

YOU'LL get more payload per pass and more passes per hour . . . step up production 10 to 50% . . . when you use a Page Automatic and use it correctly. Quick loading and immediate hoisting are the keys to big yardage. The closer the cycle of operation approaches that of a grab-bucket, the better the yardage will be. Page Automatics land in digging position, dig right in at the first pull on the loadline and get full payload within 1 to 2 bucket lengths, regardless of depth . . . 20 ft. to 100 ft. or more. With most of your operations under or near the boom end, minimum hoisting power is required.

The Page Automatic is the bucket that takes most of the "drag" out of your dragline . . . full loads in shorter distances save bucket and cable wear, reduce maintenance, minimize operator fatigue. Page Automatics are available in any size from ⅜ yd. to 30 yd. Each Automatic is guaranteed to out-dig any other dragline bucket of comparable size. For detailed information, see your construction equipment distributor, or write for Bulletin 1519.

PAGE ENGINEERING COMPANY
Clearing Post Office, Chicago 38, Illinois

PAGE *Automatic*
DRAGLINE BUCKETS and WALKING DRAGLINES

Your Coal Is Better

THAN IT IS

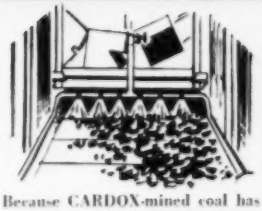
CRACKED UP

TO BE

Once the detonation of explosives has introduced shatter-cracks into coal, little can be done to decrease progressively costly degradation.

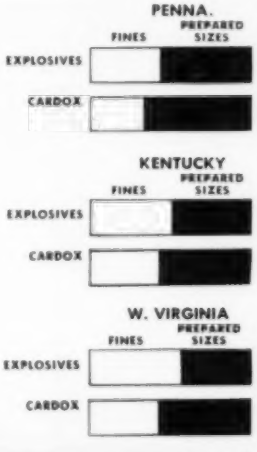
CARDOX limits degradation at the working face where it begins. The gentle, heaving action of CARDOX breaks the face along its natural lines of cleavage. The coal is firm, solid, and remarkably free from the minute shatter-cracks that cause rapid degradation at every preparation and handling operation.

Because CARDOX-mined coal retains its inherently firm structure it does not crumble even though subjected to extensive mechanical handling. For this reason it is more economical to clean, and retains its premium size through long shipments by train, boat, or truck. Write for full details on free demonstration.



Because CARDOX-mined coal has no shatter-cracks, it does not crumble when subjected to extensive cleaning and mechanical handling.

Typical Realization Increases when CARDOX replaces explosives.



CARDOX

"THE NON-EXPLOSIVE MINING METHOD"

CARDOX CORPORATION

[illegible] BUILDING • CHICAGO 1, ILLINOIS

IT'S HERE

AN OUTSTANDING NEW TIREX SHUTTLE CAR CABLE that's geared to give longer service, safer operation, and more-dependable performance through a new and exclusive feature — **TIREX Ribbed, or Gear-Shaped, Insulated Conductors.**

TIREX Ribbed Insulated Conductors are a radical improvement in the construction of Shuttle Car Cables. Gear-Shaped, they firmly interlock with the jacket so that even continual twisting of the cable cannot pull them out of position.

Think what this means! No twisted or overlapped conductors. None of the costly failures they cause. And this TIREX insulation is suited for use at high copper temperatures to assure safe, trouble-free operation during temporary overloads.

Add to these features the advantages provided by the cured-in-lead Selenium Neoprene jacket — resistance to crushing and runovers, to flame, acids, oil and heat — and you'll begin to see how much this new cable can mean to your overall operating efficiency.

Compare it with the cables you now have in use. You'll find a great difference. But remember! The greatest difference lies in tons of coal produced and dollars saved... **The new TIREX Shuttle Car Cable multiplies both!!**

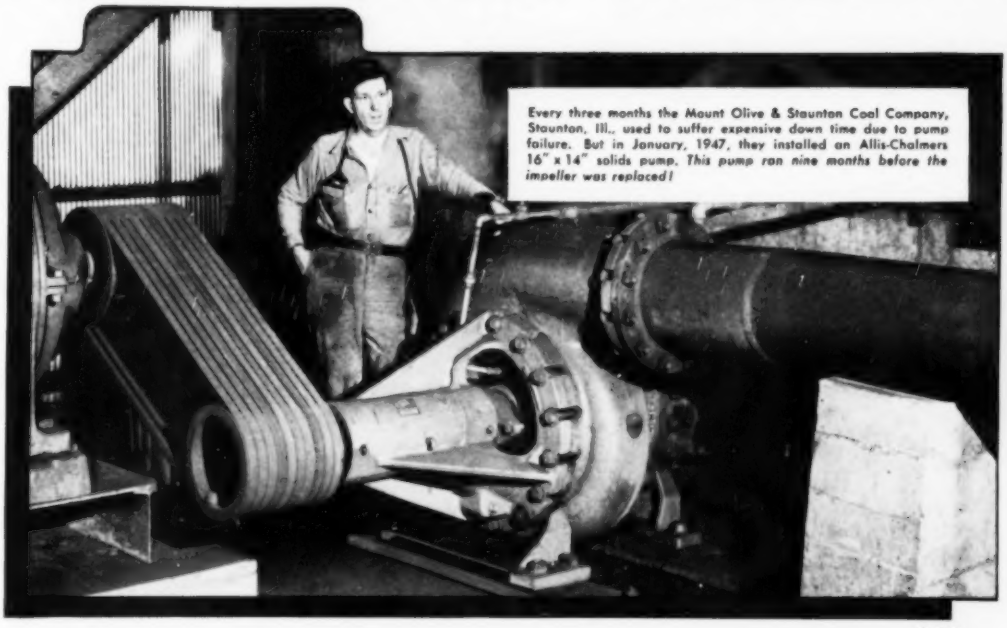
Available with or without grounding conductor. Ask the Simplex representative in your area for full details.

Simplex-Tirex **WIRES CABLES**

SIMPLEX WIRE & CABLE CO., 79 SIDNEY ST., CAMBRIDGE 39, MASS.

READ HOW ALLIS-CHALMERS SOLIDS PUMP IN ILLINOIS COAL MINE

Increased Pumping Life Three Times!



Every three months the Mount Olive & Staunton Coal Company, Staunton, Ill., used to suffer expensive down time due to pump failure. But in January, 1947, they installed an Allis-Chalmers 16" x 14" solids pump. This pump ran nine months before the impeller was replaced!

A 2698

"WE FOUND that by replacing a standard volute pump with an Allis-Chalmers abrasion-resistant solids handling pump, our full pump capacity could be maintained for prolonged periods without the necessity of expensive repairs and replacements," states Mr. J. F. Forman, vice-president in charge of operations of the Mount Olive & Staunton Coal Company.

Allis-Chalmers solids pumps are available in capacities 175 to 8,000 gpm, heads through 140 ft. Handles up to 40% solids in suspension. Capacities and heads can be varied by changing Texrope drives for correct speed. Contact your nearest A-C office for information on how Allis-Chalmers solids pumps can help you. Or write for Bulletin 08B3681B.

ALLIS-CHALMERS, 968A SO. 70 ST.
MILWAUKEE, WIS.

Texrope is an Allis-Chalmers trademark

ALLIS-CHALMERS

One of the Big 3 in Electric Power Equipment—Biggest of All in Range of Industrial Products

HERE ARE 9 FEATURES OF A-C COAL WASHING PUMPS

- High abrasive resistance of wearing parts.
- Rotating elements accessible without disturbing the piping.
- Simple design, with easy parts replacement.
- Standardization of parts — to reduce inventory.
- Low hp requirement.
- Capacity changeable by speed adjustment — without having to change impeller.
- Ability of pump to deliver near rated capacity until parts are completely worn out.
- Variable discharge nozzle arrangement.
- Heavy-duty construction with oversize shaft.

Only properly prepared coal offers *the umbrella of protection*

If you are a coal user, you find the uniformity of prepared coal a day-in and day-out protector of your coal-dollar and your coal-burning units. It delivers more BTU for your money. Each ton you buy is clean, specifically prepared to meet your requirements, and easy on your equipment. You have found your source of supply for continuous satisfaction.

If you are a coal producer, prepared coal is a protector of your markets. Satisfied customers come back for "more . . . and more . . . and more . . ." because you have the specific formula with which to meet their needs. Prepared coal also knocks at the door of opportunity. With a preparation plant you can develop salable products for new markets.

The McNally Pittsburg technical staff will be glad to unfold the profitable story of prepared coal . . . and the protection it offers you.

(Preparation Plants illustrated above, left to right, are Blackfoot Coal & Land Corp., Evansville, Ind., Truax-Traer Coal Co., Kayford, W. Va., Peabody Coal Co., DuQuoin, Ill.)

McNALLY PITTSBURG

MANUFACTURERS OF EQUIPMENT TO MAKE COAL A BETTER FUEL

Only automatic preparation *offers you day-after-day production of premium-value coals*

Automatic washers, driers, all units in the preparation cycle, respond promptly, upgrading huge tonnages to meet daily schedules.

The operating men, who direct the completely mechanized preparation equipment, develop a specialized technical knowledge that gets the tonnage out to meet customer requirements.

Sales department and customers are enthusiastically satisfied: know-how and flexible equipment give them coal to *any* desired specifications . . . and plenty of it.

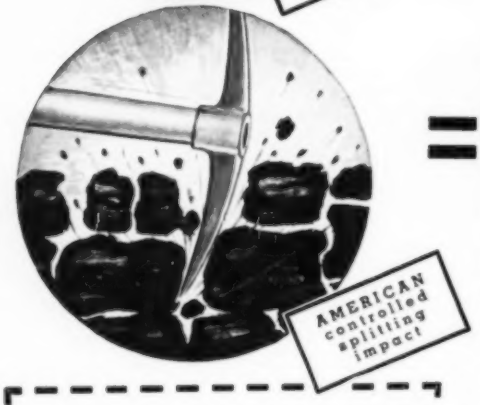
Yes, automatic preparation and skillful direction make a happy combination . . . "ready for anything." The coal they produce is uniform, car after car and day in and day out. Satisfactory performance of this premium-value fuel in the heating units of the world inspires the repeat orders that mean steady work for plant, equipment, and men.

McNally Pittsburg Manufacturing Corporation—Manufacturing Plants: Pittsburg, Kansas • Wellston, Ohio

Engineering and Sales Offices: Pittsburg, Kan. • Chicago (1), Ill. • Pittsburgh (22), Penna. • Wellston, Ohio • Caixa Postal 1310, Rio de Janeiro, Brazil

PREPARATION vs. PROFITS
answered . . . the AMERICAN way

= UNCONTROLLED SIZING
EXCESS FINES
COARSE SIZING



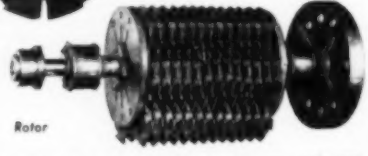
= MORE MARKETABLE
and PROFITABLE
CONTROLLED SIZING

Your profit is in the preparation — and American Crushers are designed especially to help you get higher tonnage — greater profits, with lower preparation costs. By reducing coal through cleavage instead of blunt shattering force, Americans give a controlled ratio of fines — no oversize — and permit a high tonnage output of uniform marketable sizes — regardless of the range of reduction.

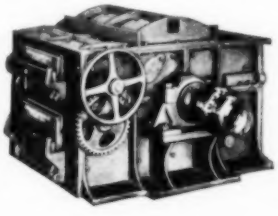
Doubly adjustable for flexibility of sizing to meet fluctuating market conditions, Americans give added savings by operating at low, power-saving speeds. Available in a wide choice of types and sizes to exactly fit your operation . . . capacities from 50 to 500 TPH.

Shredder Ring

Shown here are American's exclusive manganese steel shredder ring and rotor assembly — for rapid reduction action at slow, power-saving speeds. Each ring has twenty cutting edges — and revolves on individual shaft, free to deflect from tramp iron without damage.



Rotor



American AC Type Rolling Ring Crusher, with housing of massive, high-test cast construction, rib-reinforced to withstand enormous crushing strains. Dust-tight, machined joints. All crushing parts of manganese steel.

Send for AC Bulletin on coal crushing data and crusher specifications.

American PULVERIZER COMPANY

Originators and Manufacturers of Ring Crushers and Pulverizers

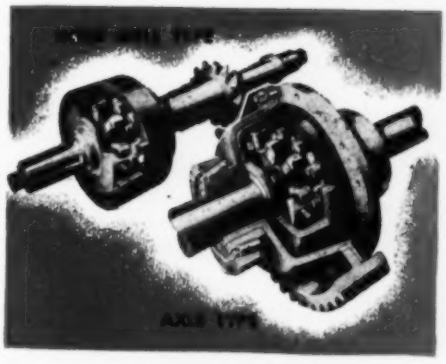
1119 Macklind Avenue
St. Louis 10, Mo.

NO PLACE FOR... "STICK-IN-THE-MUDS"

◆ Trucks that stick in the mud are an expensive proposition when you're trying to get the big loads out on stepped-up schedules. When they bog down, profits go right down with them.

Masters of the mire, Mack six-wheelers keep going through slippery mud and sand because they have the benefit of Mack's exclusive Power Divider. This unique device divides torque between the two bogie axles and between the four driving wheels. Torque is delivered proportionately to wheels having the most traction, thus eliminating dissipation of power in useless slippage and wasteful wheel spinning.

If "stick-in-the-muds" are holding you back, it will pay you to investigate the profit possibilities of dependable, hard-working Mack trucks. Write or call your nearest Mack branch or dealer for the complete story on what Macks can do for you.



it's a job for MACK TRUCKS

IT'S PART OF THE LANGUAGE

Built Like a **Mack** *Truck*

Mack Trucks, Inc., Empire State Building, New York 1, New York. Factories at Allentown, Pa.; Plainfield, N. J.; New Brunswick, N. J.; Long Island City, N. Y. Factory branches and dealers in all principal cities for service and parts. In Canada: Mack Trucks of Canada, Limited.

On the job **LONGER**

with **P-G...**

Continuous

TROUBLE FREE SERVICE

P-G *Steel Grid Resistors* built of steel and mica, coupled with exclusive features of design, make P-G Resistors capable of constant "Trouble Free" service. Specify P-G for maximum production with minimum maintenance.

P-G

The Nonbreakable Steel Grid Resistor

THE POST-GLOVER ELECTRIC COMPANY

•ESTABLISHED 1892•

221 WEST THIRD STREET, CINCINNATI 2, OHIO

NEW EQUIPMENT OFTEN REQUIRES ADVANCED TYPE LUBRICANTS

1. NEW DESIGN HEAVY DUTY UNITS such as this operate smoother and better with one of the new heavy duty type lubricants. Check the complete line of top quality Cities Service lubricants suitable for mining equipment. There's one for every job.

2. NEW TRANSPORTATION UNITS give dependable, top notch performance only when serviced with fine, fresh lubricants. Cities Service has the right lubricant for every haulage operation.

3. NEW CUTTERS AND LOADERS perform best with the right lubricant. Get the advice of a Cities Service lubrication engineer before putting them in service.

A COMPLETE LINE OF TOP QUALITY LUBRICANTS FOR EVERY COAL MINING NEED

- **Coal mining machinery greases**
- **Diesel engine oils**
- **Gear oils**
- **Hydraulic oils**
- **Pneumatic tool oils**
- **Cable dressings**
- **Air compressor oils**
- **Motor oils**

Free—A helpful new booklet COAL MINING MACHINERY LUBRICATION is available upon request. Write Cities Service Oil Company, Room 412, Sixty Wall Tower, New York 5, New York.

CITIES SERVICE

SPEED UP YOUR JOBS...
MEET YOUR SCHEDULES...
CUT DOWN YOUR COSTS...
with

Firestone
OFF-THE-HIGHWAY TIRES

PROFIT is the difference between making time and marking time . . . between going through and going down. You can throttle your downtime, accelerate your production time, and increase your profits with Firestone Tires.

If you need a tire with plenty of reserve pulling power for even the softest going, the Firestone Ground Grip will fill the bill—and it will give you the extra tread life and the extra body life that make your tire dollars go further.

And where you need maximum traction for rock work, strip mining, and other severe operations, get the tire with the toughest, most aggressive tread ever built—Firestone Rock Grip. It will be on the job after other tires are on the scrap pile.

The Firestone Earth Mover is the tire for free-rolling wheels that must move heaping loads over sand and soft earth. It provides maximum flotation and maximum life at minimum cost.

Listen to the Voice of Firestone every Monday evening over NBC and Americana over NBC Network Television Stations

EARTH MOVER GROUND GRIP ROCK GRIP

When you buy Replacement Tires or when you buy New Equipment specify —

Firestone

OFF-THE-HIGHWAY TIRES

Copyright, 1949, The Firestone Tire & Rubber Co.

DU PONT ANNOUNCES

A New and Improved Wood Preservative

COPPERIZED CZC

(Chromated Zinc Chloride)

Gives even longer-lasting all-round protection

Now—timber and lumber can have even greater service life than has been obtainable with standard CZC (Chromated Zinc Chloride) treatment. New Du Pont *Copperized* CZC—backed by ten years of laboratory research and field testing—gives promise of being the best all-round salt-type wood preservative ever developed.

In addition to showing far greater preservative effect than standard CZC (Chromated Zinc Chloride), this outstanding new *Copperized* product offers all these same advantages:

- Decay resistance
- Termite repellence
- Fire retardance
- Easy to paint
- Cleanliness
- No odor
- Safe to handle

THESE 6 SIGNIFICANT TESTS SHOW ITS EFFECTIVENESS

1. Leach block test
2. Hardware corrosion test
3. Accelerated service test
4. Pilot plant treatments
5. Strength tests
6. Glow tests

Clip coupon for more facts *on new Copperized CZC. E. I. du Pont de Nemours & Co. (Inc.), Grasselli Chemicals Dept., Wilmington 98, Delaware.*

DU PONT

BETTER THINGS FOR BETTER LIVING THROUGH CHEMISTRY

COPPERIZED CZC

(Chromated Zinc Chloride)

E. I. du Pont de Nemours & Co. (Inc.)
Grasselli Chemicals Department—CA-1
Wilmington 98, Delaware

Please send me more facts on new Copperized CZC.

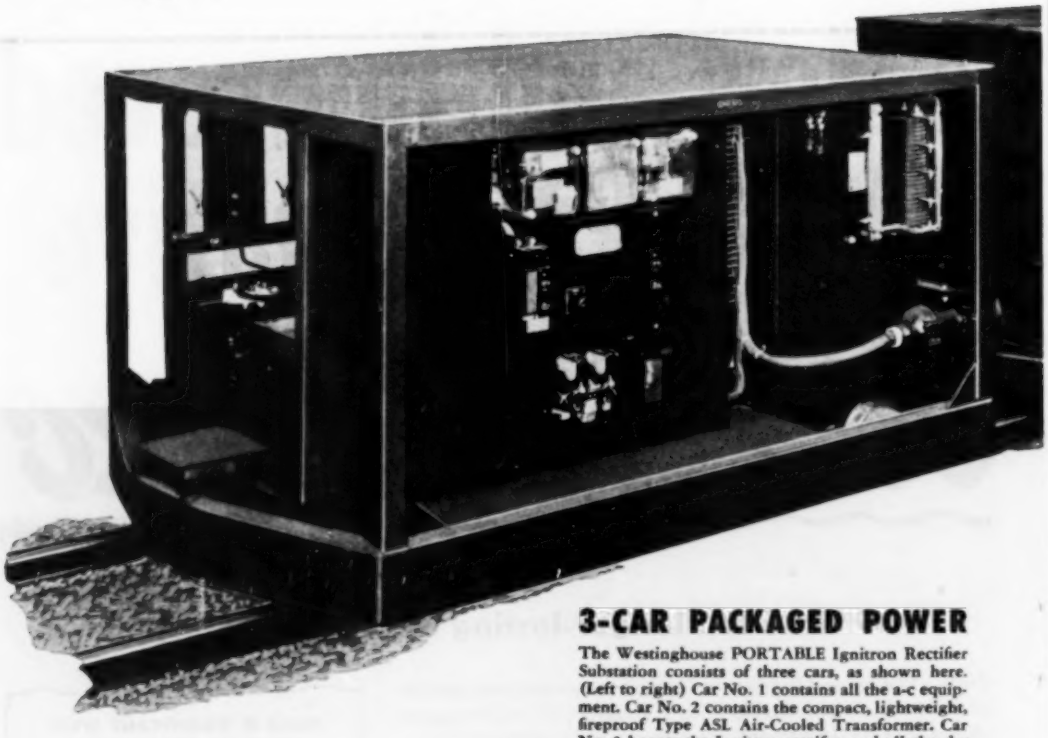
Name_____ Title_____

Firm_____

Street_____ State_____

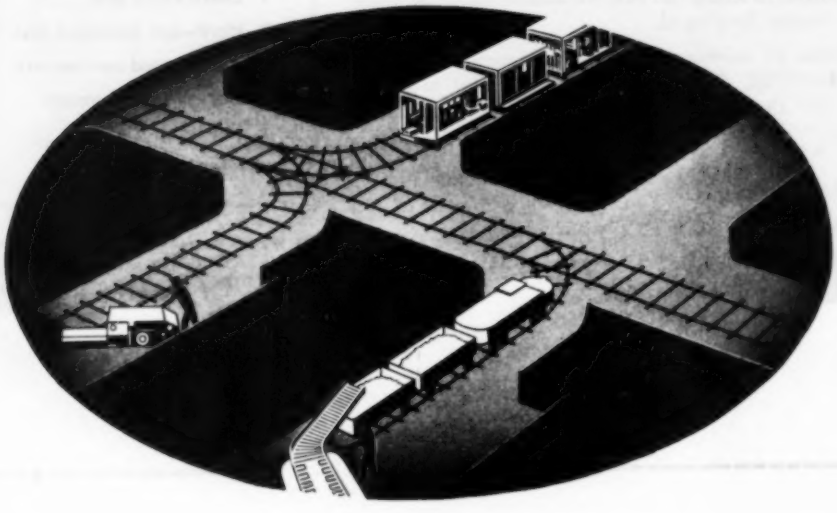
YOU CAN BE **SURE**.. IF IT'S

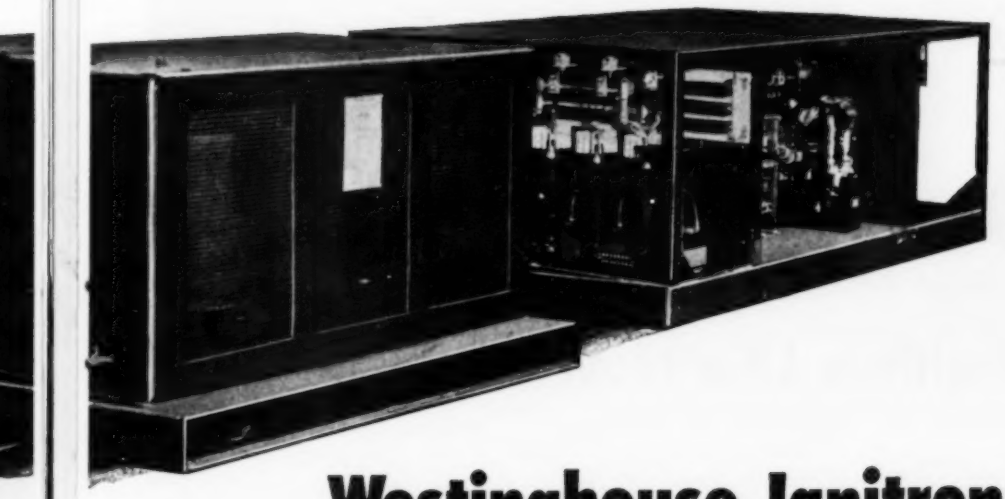
Westinghouse



3-CAR PACKAGED POWER

The Westinghouse PORTABLE Ignitron Rectifier Substation consists of three cars, as shown here. (Left to right) Car No. 1 contains all the a-c equipment. Car No. 2 contains the compact, lightweight, fireproof Type ASL Air-Cooled Transformer. Car No. 3 houses the Ignitron rectifier and all the d-c equipment. This arrangement makes possible a compact unit, light in weight and easy to handle.





Westinghouse Ignitron

THE HEART OF LOW-COST MINING

Working areas advance so rapidly in modern underground mining, there's only one sure way to get efficient, continuous operation of machinery at the face. That is by having co-ordinated electrical equipment to deliver ample power.

The heart of this equipment is the Westinghouse PORTABLE Ignitron Rectifier Substation. It has many advantages over conventional rotating power-conversion machines.

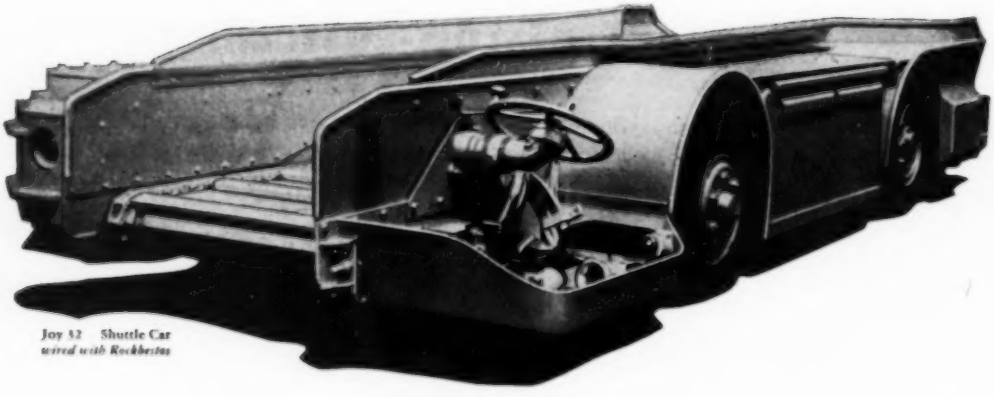
1. **High efficiency at all loads**—less kilowatt-hours, less power loss and lower maximum demand.
2. **Capacity for frequently repeated severe overload**—high load swings are handled readily.
3. **Reliability**—less lost time and increased production.
4. **Ease of installation**—unit is completely self-contained, requiring only connections to the power source and the load.
5. **Light weight**—easily moved to new locations.
6. **Reduced maintenance**—no large rotating parts; no large bearings, commutators or slip rings to replace or maintain.
7. **No surge or high inrush during starting.**
8. **Quiet operation.**
9. **Reduced fire hazard.**
10. **No danger from overspeeding.**

Westinghouse pioneered in the development of Ignitron rectifiers for mining service. Today, more Westinghouse rectifiers are in use than those of all other manufacturers combined.

If you have problems that pertain to the use of power for low-cost coal mining, whether underground or stripping, call your nearest Westinghouse District Office, or write to Westinghouse Electric Corporation, P. O. Box 868, Pittsburgh 30, Pennsylvania. J-94806

Westinghouse

How to keep a Shuttle Car Shuttling Like New



Joy 32 Shuttle Car
wired with Rockbestos

Good equipment requires very little care . . . need for replacements is rare.

And when replacing wire and cable, the best means ROCKBESTOS . . . *the mining cable that was engineered for use in severest mining conditions.*

As a matter of fact, Joy Manufacturing Company and other first-line equipment builders have, for years, wired shuttle cars, loaders, cutters, locomotives and other mining machines with ROCKBESTOS as original standard equipment. It's the cable that can't burn . . . can't support flame . . . *can* and *does* last longer than ordinary cable.

When buying new mechanized units and when re-wiring old equipment . . . be *sure* . . . specify "ROCKBESTOS!"

ROCKBESTOS PRODUCTS CORPORATION
NEW HAVEN 4, CONN.

NEW YORK CLEVELAND DETROIT CHICAGO
PITTSBURGH ST. LOUIS LOS ANGELES OAKLAND, CALIF.

WIRES and CABLES by

ROCKBESTOS

. . . . . ***dare to be better***

PUSH .. where it pays!

Oliver "Cletrac" Model FDE Heil Trailbuilder on large land clearing project.

An Oliver "Cletrac" crawler tractor and its Heil dozer puts a big "push" behind any dirt moving job. The extra pushing power you get with an Oliver "Cletrac" permits you to handle bigger loads . . . get the job done faster! Here's why!

With the Oliver "Cletrac" exclusive steering principle, there is always power on both tracks . . . you never have to sacrifice "push" to make a turn. When you pull back on the steering lever, the track on that side slows down, the other speeds up to give you a power turn with plenty of load-handling ability. And, the off-center loads of dozing operations can be handled with no loss of time since the pull of the off-center load can be balanced by speeding up the track on the more heavily loaded side. You don't have to "zigzag" . . . can travel a straight line for most effective dirt moving.

For all the facts on Oliver "Cletrac" tractors and their time-saving, cost-cutting steering, see your Oliver "Cletrac" Distributor.

Cletrac

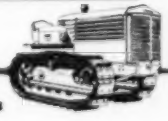
a product of

The OLIVER Corporation

Industrial Division, 19300 Euclid Avenue, Cleveland 17, Ohio

OLIVER Cletrac SALES SERVICE

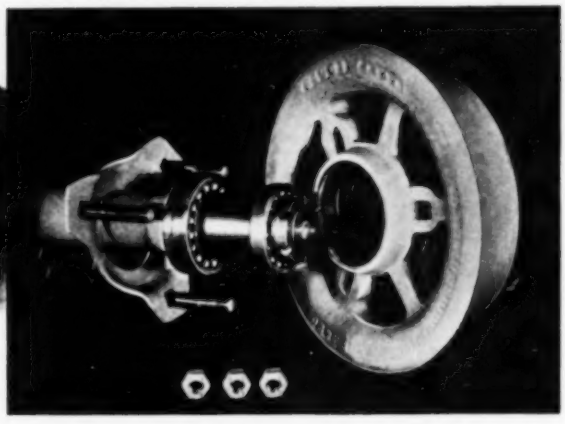
"THE SIGN OF EXTRA SERVICE"



A Complete Line of Crawler and Industrial Wheel Tractors

are "FLOATERS" Demountable?

YES!..and in less time than it takes to smoke a cigarette...

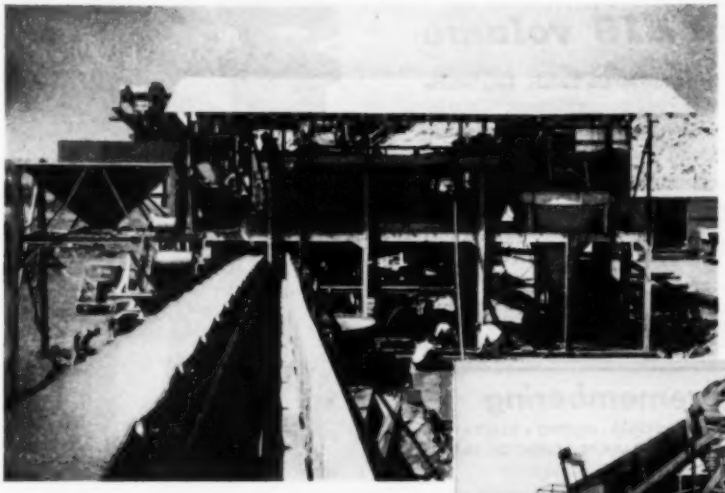


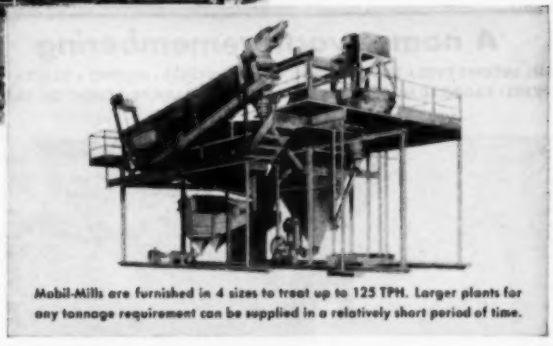
Here's the mine car wheel that you demount as easy as changing the wheel on your automobile. Remove three nuts, slip the S-D "Floater" wheel off, and the bearings remain in perfect adjustment on the axle. When a wheel needs replacing, you want it done *now* — in a hurry. Changing a "Floater" is so quick and simple that it doesn't even require an experienced mechanic. Because of precision fit and closed hub, grease leakage is eliminated to a point where the "Floater" requires fewer greasings than any mine car wheel made. The "Floater" principle of one set of bearings locked and one set which "floats" automatically into perfect adjustment, reduces bearing replacements to a minimum because pinching, out-of-alignment, loose or tight bearings are impossible. When it comes to performance, there is no equal to "Floaters." Independent engineers' tests have proved that up to 50 per cent greater tonnage may be hauled with no increase in power consumed in cars having "Floater" wheels as compared to other types of precision bearings. Write today for Wheel Folder No. 7105.

20 Car loads of "Automatics" from—

SANFORD-DAY IRON WORKS, Inc. Knoxville 9, Tenn.

COMPLETE PRODUCTION PLANTS TO ORDER . . . NOW





Mobil-Mills are furnished in 4 sizes to treat up to 125 TPH. Larger plants for any tonnage requirement can be supplied in a relatively short period of time.

- For operators who want RESULTS TODAY —with MINIMUM CAPITAL INVESTMENT— the Mobil-Mill offers a sound, simple solution.

- The WKE (HMS) MOBIL-MILL PRODUCTION UNIT can be installed, ready-to-operate in one week after delivery at the job site.

- Available for shipment in 3 to 6 weeks (deliveries are often made from stock), complete Mobil-Mill plants provide operators with the most efficient and lowest cost method of coal cleaning and mineral beneficiation—the Heavy Media Separation process.

MORE THAN 10 MILLION TONS PER YEAR (rated capacity) are now being handled by WKE (HMS) Mobil-Mill units. All ores amenable to heavy media separation can be treated by Mobil-Mills. A few of the ores now being treated are

COAL	**BASE METALS**
IRON	**BARITE**
FLUORSPARS	**ROCK AGGREGATES**

For full particulars consult the WEMCO office nearest you.

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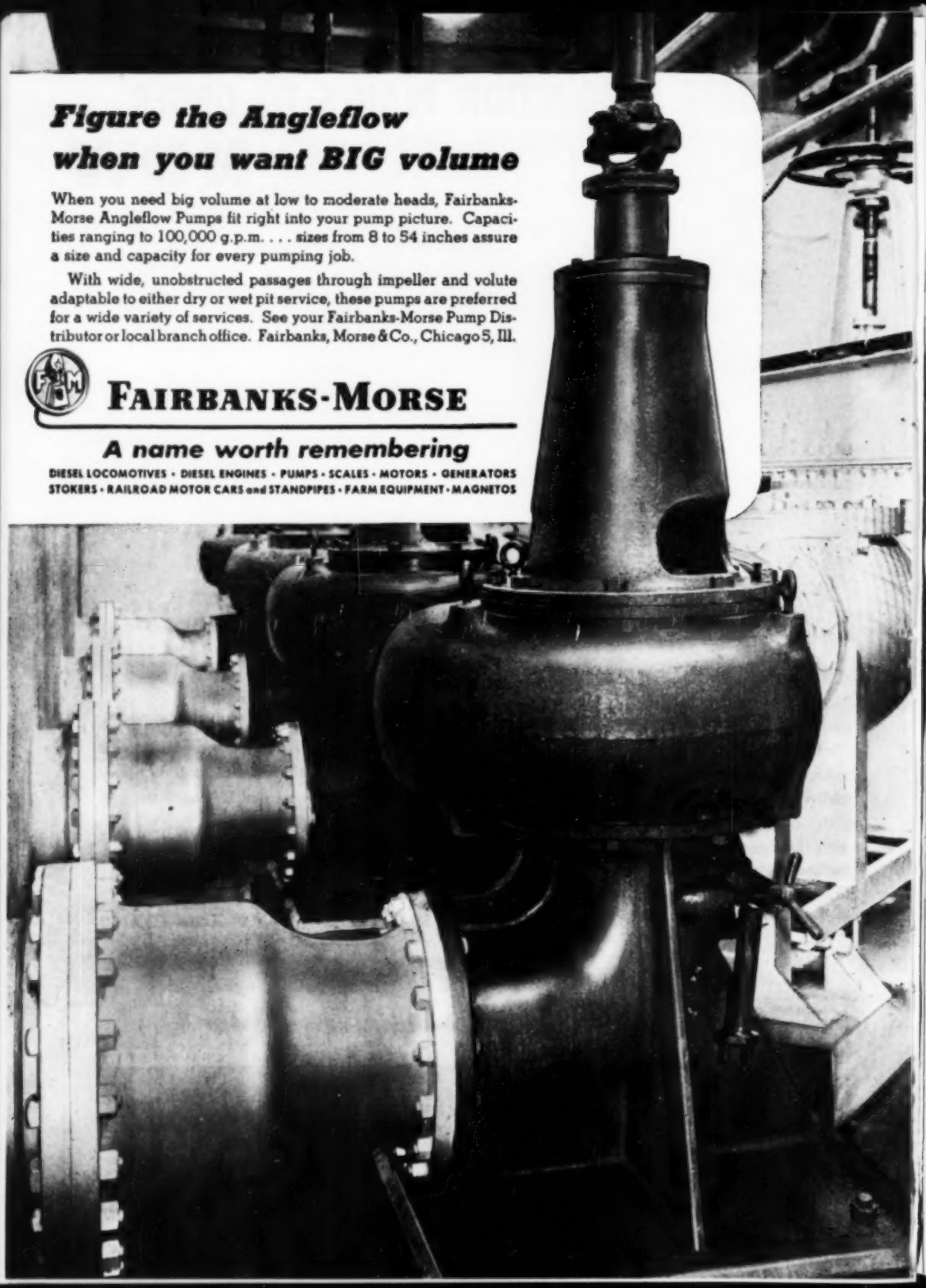

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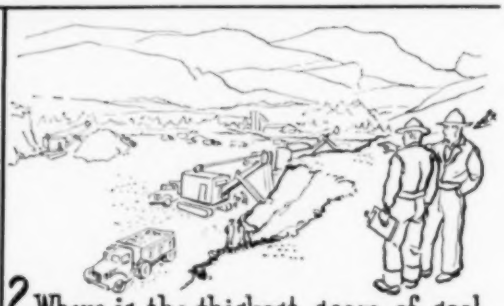
Coal Facts #4.. ..A ONE MINUTE *QUIZ*...FOR MEN IN THE COAL INDUSTRY

1 Where is the thickest seam of coal in the world?



2. Where is the thickest seam of coal in the United States?

3. What is the thickness of the average bituminous seam in the United States?

4. Which coal loading machine is equally effective in loading coal or rock?

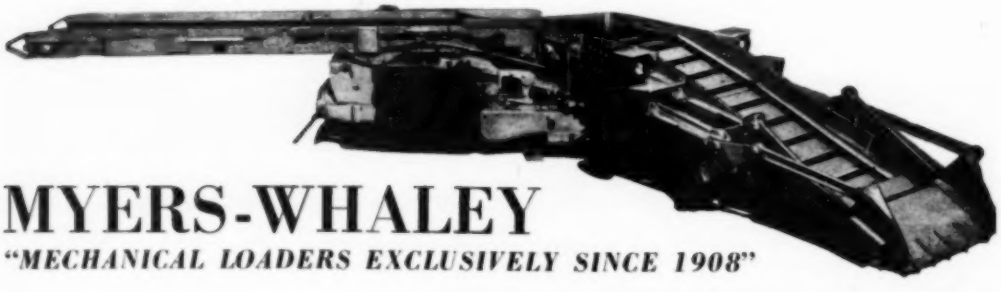
Answers:

1. In China there is a seam of coal 400 feet thick. It is mined in steps in a manner similar to quarrying.

2. In Wyoming there are two seams of coal measuring over 90 feet thick which are mined by strip methods. Others in this country measure 40 to 50 feet.

3. The average thickness of all the bituminous seams in the United States is 5.4 feet according to the U. S. Bureau of Mines.

4. Most any loading machine can handle rock for limited periods but the Whaley "Automat," built for fast coal loading production, is designed also to take the brutal punishment that rock and slate impose on a loader. That is why the Whaley "Automat" can handle, in its stride, any rock work incidental to cleaning up of falls, making grades, and the taking of top or bottom rock to increase height in entries of thin seam mines. This versatility is in addition to its ability to deliver big coal tonnage safely . . . swiftly . . . smoothly at worthwhile savings in power and maintenance. Write today for complete information on the Whaley "Automat." Myers-Whaley, Knoxville 6, Tennessee.



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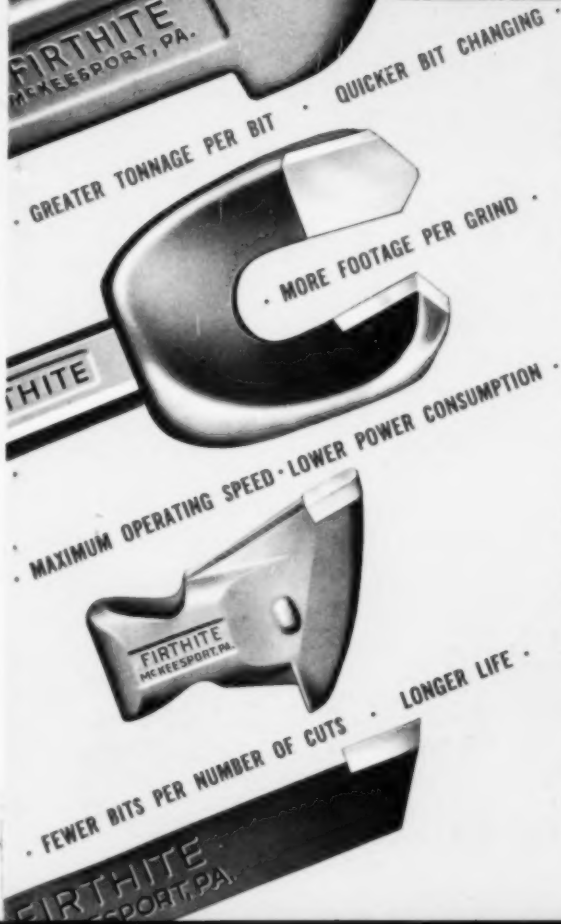
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A Mine in the Eagle Seam

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Devoted to the Operating, Technical and Business Problems of the Coal-Mining Industry

Coal Age

JUNE, 1949 IVAN A. GIVEN, EDITOR

Power and Progress

HOW FAR the coal-mining industry has come in the use of power to cut costs—and some glimpses of what the future holds in further developments—again were highlighted at the 1949 Coal Show of the American Mining Congress. Now, coal is well on its way toward becoming almost completely a producer by power, with applications going all the way down to power-operated personnel carriers to conserve the time of only a single supervisor, repairman or electrician.

The trend is a healthy one, cost of the equipment notwithstanding. The record shows that industries and nations that rely on hand work sooner or later become poor industries and nations. Power equipment means greater production of wealth—coal, shoes, autos and so on—per man-hour expended, and this greater production per man-hour means in turn a higher standard of living.

Putting it another way, growth in the use of power equipment means, all other things being equal, a lower cost for any industry. Lower cost means greater competitive power in the market place. This is especially important to coal if it is to make the most out of its research, public-relations and sales expenditures. Power equipment has proved its value in coal mining. Now, the goal should be more of it more efficiently used.

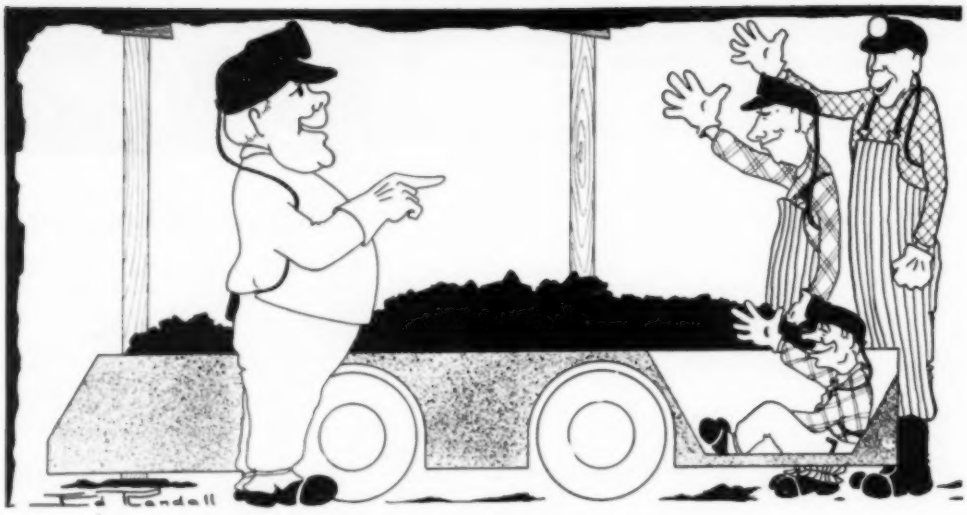
Coal in '49

IS COAL going to take a major shellacking tonnage-and otherwise in 1949? As a result of warm weather in the early months, an upsurge in competition, a drop in exports and some cutbacks from postwar peaks in manufacturing, the production rate has dropped back, particularly in anthracite, where weather and, apparently, expectation of lower prices depressed output severely in the opening months. But—will that be the story for the remaining months, winding up in a sadly reduced total for the year.

It could be that way but the evidence so far is to the contrary. At the moment, competent forecasters see a high level of business activity for the last half of 1949, although, of course, not as high as in the same period in 1948. As business goes, so goes coal, and a significant straw in the wind, perhaps, is the recent and widespread reopening of truck and contour strip mines in a number of producing districts. All these and other factors are contributing to a firming up of the production rate. With a reasonable break in temperatures in the coming winter season, therefore, there will be a lot of coal used this year. To be specific, it is reasonable to expect at this moment a bituminous production of better than 560 million tons in 1949 and, if buyers do not wait until the last minute and thereby swamp producing facilities, an anthracite output that will offset to a considerable extent the losses incurred earlier this year. To sum up, all the signs indicate that there will be ample business to support a healthy coal-mining industry not only in 1949 but in the future.

Key Consideration

A WHILE BACK, in a letter to the anthracite industry, Joseph J. Walsh, Pennsylvania Deputy for Mines, brought out in vivid fashion the part played by the human element in mine accidents. Analyzing 1948 results, Mr. Walsh pointed out that only 16% of the fatalities in that year were "chargeable to the hazards of the industry." The others he credited to lack of precaution, lack of experience, lack of sufficient care and the human tendency to follow inclination rather than reason. These findings point up even more strongly that man is the greatest hazard even in such a naturally hazardous industry as anthracite. Following through, it becomes even more logical to concentrate on the man, whether boss or worker, to achieve the greatest progress in safety.



Being a Better Boss

Good Foremanship the Key Factor in Safe and Efficient Production—Skill Needed in Handling Men, Machines, Materials and Supplies—Human Relations the Hardest Problem—How a Foreman Can Measure Improvement

LIKE MOST OTHER FOREMEN in coal mining, you probably came up the hard way. That is, you started out as a miner or day man and, by the way you went at your work, gave your boss the idea that you had something on the ball. Then, when your own boss moved up to mine foreman or superintendent, he picked you to take his place because he had watched you work and had learned to trust you.

Now, as a boss, you're part of management. As far as your men are concerned, you stand for the company. To back you up, you have the following things in your favor:

1. Your own experience and know-how.
2. The facts about your company and what keeps it going.
3. Machines, materials and supplies to keep the coal moving.
4. Workers—the men who, in the long run, can make you or break you.

With these things on your side, how are you doing as a foreman? Are you as good as you could be? Can you do better, with gains for your company, your workers and yourself?

Your job, everybody agrees, is to get coal at the lowest possible cost and guard the safety of your men. That sounds simple to somebody who doesn't know better. But you know it's not as simple as that, because you stick at the job and face its problems day by day.

To repeat, your company provides you with machines, materials, methods and men to keep coal moving out of the mine. Beyond that, you're the boss. What you do with what you have plays a big part in whether your company stays in business and makes money, whether you and your men work steadily and whether you move up to a still better job when there's an opening.

Machines are built pretty much to the same pattern. If you connect a machine to a power line, push the levers back and forth and give it something to work on, it will drill or cut or load or haul coal at a steady rate of so many feet or tons or miles per hour. It doesn't have any ideas or notions of its own. It always obeys commands and asks no questions.

The same thing is true of materials and supplies, such as bits and timber, track and explosives, cable and grease. They have no notions of their own. Put them in the right place at the right time and they'll do their job—and no questions asked.

Your mining methods also are pretty well fixed. You, your fellow bosses and your superiors figured them out after a lot of experience and study. You set up a system for moving up pans, setting timbers, tramming cutters and loaders, extending belts and moving cars and locomotives. You allowed for different conditions—bad top, sulfur balls, pitches and faults. In other words, you planned everything ahead to get the most out of machines, materials and supplies under good and bad conditions.

So, on paper at least, everything ought to go all right. The trouble is, it doesn't always work that way. Machines break down, power goes out, a car jumps the track or your men run out of bits or powder. And sometimes, even if everything else goes all right, your men just don't measure up to what you know they can do. These are the days that really put your skill as a foreman to the test.

The truth is, these things don't just happen. There always is a reason for them and lots of times you, as the foreman, can do something to keep them from happening. Leaving out, for the time being, the things you can do to gain the cooperation of your crew, here are some ways to streamline your foreman's job and speed the flow of coal to the tipple:

1. Insist on good repair and maintenance of machines. The right kind of maintenance—regular greasing, tight seals, clean working parts and replacement of worn cables and pins—prevents long shutdowns for major repairs, lengthens machine life and keeps the coal moving, to say nothing of keeping accidents down. Likewise, top-flight maintenance work means more operating time before the next major repair session but a shoddy baling-wire job is a sure way to cause a quick breakdown, electrocute a man or set off an explosion.

2. Schedule materials and supplies ahead. That means planning the job and figuring what it needs, so the right things will be at the right place in the right amounts at the right time. For example, your men can't advance a room without timber. If they run out of timber an hour ahead of quitting time, you might as well send them out, because they've done all they can do that day. The result is that your company has to pay each man for an hour he didn't work. In addition, the chances are that your men, remembering how they stopped an hour early one day, will slow down the next day. A better schedule for timber will help make every day a full working day.

On the other hand, be careful you don't clutter up working places with too much material. Too much timber, for instance, gets in the way of men and machines and may even get covered up and left behind as the room advances. That, too, costs money. The best plan is to get enough timber and a little to spare at the face. That way you keep the work going and have a margin to take care of unexpected roof faults or an unusually fast loading speed.

3. Keep up with what other crew foremen are doing. It's easy to get smug and cocksure about the way you do your job and to think your own way is the best and only way to mine coal. The truth is, nobody has all the answers, not even you, and something new comes up every day. Some other foreman may have found out how to get a machine from one place to another in the mine with a minimum of delay while you go right ahead in your old way, losing time for the company and letting other foremen get ahead of you. The moral is, talk freely with other foremen about your job and your problems and listen carefully to what they say. If you keep your ears and eyes and mind open, you may pick up something that will put your crew out in front of the others.

4. Keep foremen in other departments posted on your needs and problems. For example, if cutter bits are getting dull too fast, tell the shop foreman. He might check up on sharpening or tipping practice and thus stretch the life of bits. If power is low or unsteady at the face, the chief electrician can help you out by adding a feeder or moving the substation up.

On the other hand, you may be able to help a foreman in some other department and thus improve the whole company outlook. Maybe, for instance, your crew is sending out big lumps that can't be handled by the tipple crew without adding an extra man or slowing down the speed of the cleaning plant. A little extra help from your men in breaking up the biggest lumps would speed the tipple foreman's job. Or you may be able to help the haulage boss by changing your loading cycle a little. This way, you'll be doing your share to make your mine a smooth, fast-working outfit.

5. Keep your eye peeled for waste. Profits in coal mining are pretty thin and a little waste can wipe them out completely. It doesn't take long to wear out a cable when a shuttle car or a loading machine keeps running over it. Bars and picks covered over with gob and left behind are just so much wasted money. Timber that is too short has to be thrown away or held and moved forward until it can be used. Timber that is too long has to be cut, and that takes time. Throwing away a few half-used bits is like tossing half a dollar down a well. Add up the cost of these and other careless wastes and, before you know it, your company is losing money instead of making a profit.

6. Keep up with what's going on in the front office. If you do, you'll be out in front when changes are ordered. Maybe it's a change from belts to shuttle cars or from 2-ton to 10-ton mine cars. In any case, if you're wise to the change before it's ordered, you'll have time to think through some of the problems, plan your operations and get your crew used to the new idea.

7. Keep records. With day-by-day records of how your crew's tonnage goes and the things that happen to slow operations down, you'll soon find out where the worst trouble spots are. Then you can correct them. Likewise, you'll soon spot the things that push tonnage up. Remember that it's just as important to know the tonnage-boosters as the tonnage-stoppers.

8. Study a job out before you pass it on to your men. Go to the

How a Boss Gets the Best From Machines, Methods and Men

place where the job has to be done, think it through on the spot and decide how it ought to be done. Then you'll know about how long it ought to take, how many men are needed, what tools and supplies are required and which men can do it best and you'll be ready to tell your men about it.

The eight steps suggested above will take you a long way toward successful foremanship. If you follow them you'll get the best your machines, your methods, your materials can give—except for what your workers can add.

That's the hardest nut you have to crack—getting your workers to give their best. It's also the biggest challenge to your skill as a boss. You and your company can buy the best machines, bits, cables and explosives on the market and you can work out a mining plan that will break all records—on paper. But these things won't pay off unless you have loyal, willing men in your crew. You can't buy loyalty, cooperation and enthusiasm from a manufacturer or get them by sending an order to the supply house. You've got to earn them. That's up to you. Your men can make you or break you.

By and large, a foreman's skill in getting the best out of his men shows up in the following ways:

1. Giving orders.
2. Handling complaints and grievances.
3. Training new men and showing new jobs to old hands.
4. Boosting safety.
5. Building job pride.
6. Earning respect and loyalty.
7. Keeping himself on his toes.

In each of these, the human element is the biggest factor and the hardest to handle. If you can make your workers look up to you and be proud of working for you, they will respect their company and will work willingly and loyally for the company's good. If you have trouble along these lines, your production will slip and your record will look bad. If, therefore, your machines aren't turning out all the coal they ought to, here are some down-to-earth suggestions that may help you.

GIVING ORDERS—After you've sized up the job—how many men are needed, which men are best fitted for the job, what materials and tools they need, and when the job ought to be finished—you're ready to pass the word along to your men. If it's a complex job, make some notes about materials and tools needed, sizes, dimensions and other details, just to make sure you don't forget something important.

The first step in telling your men about the new job is to define it—where it is, what it is, why it has to be done, and how it fits into the whole operation. Next, give the detail, breaking down the job into its steps and explaining each step. Your notes will be helpful here. Third, show how to do it. Use a drawing, or sketch it out on the ground with a stick, or, if it's operating a tool or a machine, go through the steps a couple of times yourself while your men look on. Fourth, review it, discuss it, tell how long you think it ought to take, say who is responsible for what and give your men a chance to ask questions. Stick around while they get under way with the job to answer any final questions and to get them started right. Finally, check up on them later to see if they're doing all right or need anything. Don't just let things drift. Follow through.

When you give orders, don't mumble and don't cut your orders short. Speak clearly and slowly. That way, you'll get better results and your men won't be always coming back to you to ask questions about things they didn't understand.

If it's an order that the superintendent or the general manager gave you, back it up whether you like it or not. If you don't like it, tell your superior, not your men. Don't pull the rug out from under him by apologizing to your crew for the order or letting them know you don't like it.

HANDLING COMPLAINTS AND GRIEVANCES—You have to listen to a lot of beefing that doesn't seem important to you. That's just part of a foreman's job. Whatever you may think of a complaint, it is important to the man who makes it and it's up to you to listen patiently and hear him through. Don't rattle the change in your pocket or work on your reports while he's talking. Give him your full attention.

Don't get trapped into an argument and don't lose control of the conversation. Hold the complainer as close to the facts as you can and then, when he has talked himself out, summarize the facts as you understand them and give him a chance to clear anything up.

Don't make a hasty decision about a complaint and don't fire a man right off. Firing ought to be a last resort, after you have exhausted reason, persuasion, instruction and warning. If you act hastily, you may get so far out on a limb that you can't back up. So, be sure you've got all the facts and then, guided by the facts and not by your likes or dislikes, act promptly. Acting promptly means steering a middle course between hasty decisions and letting things drift.

Don't threaten and bluster. It's just as bad to threaten something you really don't intend to do as to promise something you can't make

good on. You won't win cooperation either way. And don't try to put the complainer on the run. Put yourself in his place and try to understand how he feels. Give him a chance to back down without hurting his pride when you show him where he's wrong. Be firm and reasonable, stay within your authority and keep your voice on an even pitch.

Don't take a strong hand on a weak position or a weak stand on a strong position. It's much better to give in on a few minor issues and save your real strength for the big issues. That way, you'll stand a better chance of winning on the points that really count.

If you want to cut down on the number of complaints and grievances your men throw at you, keep your eye open for the things that cause them—water in the working place, bad air, unsafe man-trips, and the like. When you see something that might cause a complaint, do something to correct it right away. Don't wait until somebody squawks and then make a faint promise.

Don't think you've settled a grievance for good when you get a ruling on it. If you were wrong—if you made a hasty decision, overstepped your authority or didn't give full instructions—find out where you made your mistake and guard against making the same mistake again. If your worker was wrong, make sure he understands why. Follow up the ruling with a visit to clear the air and try to rebuild friendly relations.

TRAINING NEW MEN AND SHOWING NEW JOBS TO OLD HANDS—A new man is your baby after he has been through the hiring process. It's important for you to start him out right.

Before you take your new man underground, take him aside for a talk. This will give him a chance to learn something about you and will help you size him up. Tell him in general what a coal-mining job amounts to, what the company expects and what things are like underground—noises from loading machines, shaker pans, blasting, locomotives and mine cars, and dangers from swinging booms, shuttle cars, exposed cables and bad roof. Any man going underground for the first time will be nervous but he'll be less nervous if he knows in advance what to expect.

Also, before you take him underground, tell him about the state mining laws and the Federal Mine Safety Code, especially those parts that apply to his job, and explain company rules and practices that affect him, such as paydays and holidays, notice of working days, grievance procedure, overtime, getting supplies, smoking on the job, the man-trip schedule and other matters. By all means, give him a chance to ask questions.

When you take your new man inside for the first time, show him as you move along the things you talked about outside. Point out escapeways and safety equipment and explain the noises he hears.

When you reach the working place, stop the crew and introduce the new man around, giving them all a few minutes to get acquainted. Tell him what he has to do and then, after you've shown him how to do it and how to protect himself, let him go through the job while you stand by and watch him. Point out his mistakes and answer his questions. Before you leave him, pick out an old hand to work along with him and guide him.

Check up on your new man often during working hours to see if he's getting along all right. Two or three times during his first week or so on the job, catch him after the shift to see how he's doing and how he feels about his work. That way, you show him that you're interested in him and you get him off to a good start.

Showing new jobs to old hands is different and often is harder than breaking in a new man. The trouble is, old hands are used to doing things their own way and they sometimes resist changes. That's why, in putting across a new method or a new machine to his experienced men, a boss has to do a selling job.

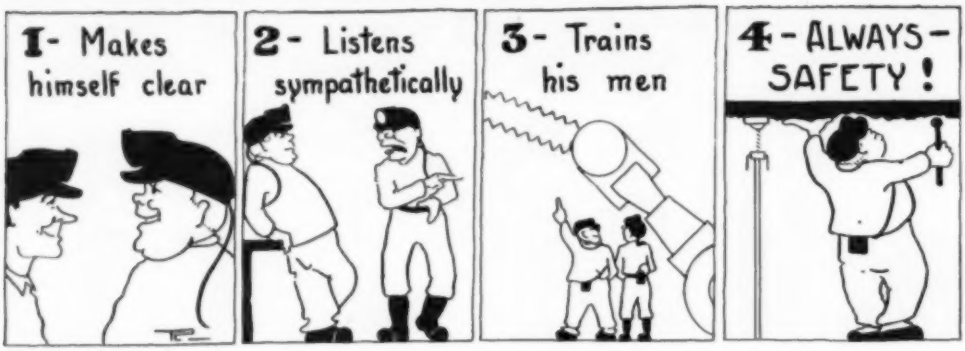
When you have something new to show to your old hands, study the whole thing out for yourself ahead of time—how it works, what it does, how it adds to safety and how it's a step ahead of the old machine or the old method.

Don't spring the change on your men all at once. Tell them in advance what's ahead so it won't be a surprise to them. With the way thus prepared, your selling job already is half done. What you have to do now is tell your men the things you figured out ahead of time—how it works, what it does, how it makes the work safer and how it's a step forward in getting out more coal, making the work easier and helping the company and the men.

One of your best chances for on-the-job training comes when somebody makes a mistake. When a man does something wrong, try to find out why. Did he just not know any better? Was he over-eager or nervous? Was it due to his own carelessness or poor housekeeping? If a man makes a mistake, that's no reason for you to fly off the handle. It is an opportunity to show how to do the job right. A good foreman makes the most of a chance like this.

BOOSTING SAFETY—If you've

How a Boss Keeps on Good Terms With His Workers



done your training job well, you've won half of the battle for safety. That is, you've given your men a good start. The other half of the battle depends on how sharp you are with your equipment and how safety-conscious you keep your workers.

If you're a good foreman, you'll keep a sharp lookout for equipment faults that cause accidents. Some of these are jagged edges on mine cars, exposed cables and loose connections, poor tools, bad maintenance and lack of the right materials and supplies, leading to makeshifts. When you spot these troublemakers, correct them right away. Keeping equipment in good condition is one way of showing your men that you and the company want to do your share to make coal mining safe. That helps build teamwork for safety.

Keeping your men on their toes about safety takes a lot of human-relations skill. You've got to talk about it often but you mustn't nag about it. You've got to be strict without being a dictator. You've got to earn the cooperation of your men without giving up your authority. And you've got to be a good amateur psychologist. That is, you've got to understand what makes men tick and gear your safety salesmanship to the things they react to. Although every man differs from his neighbor, most men respond to certain basic appeals. Some of these appeals are love of home and family, desire for promotion and recognition, fear of pain, fear of being broke and jobless, desire to be one of the gang and pride in a job well done. Analyze your men one by one to see what each one reacts to and steer your safety appeal to that target.

BUILDING JOB PRIDE—First of all, don't try to drive a square peg into a round hole. That is, as far as you can, see that each man gets the job he is best fitted for, because a man works more cheerfully when he's doing what he can do well. If he has a knack for machines, put him on a loader or a duckbill. If he likes to show off his muscles, put him on timbering. If he does better as a lone wolf than with the crew, put him to laying track or tending a transfer station.

No matter what job a man has, build up its importance in his mind. Show him how it fits into the whole mining operation and what happens if he doesn't do his job well—how quality falls off, how the face crew has to slow down, how the mine becomes unsafe or how the tipple has to stop.

Take time out once in a while to tell a man he's doing all right. Running a coal mine isn't like running an army, where nobody gets a special word of praise unless he does something "above and beyond the call of duty." In a coal mine, it helps a worker along just to tell him he's doing his job well. That way, he knows where he stands.

Above all, don't overlook giving a man credit when he does something special, like figuring out a better way to spot mine cars or lay more track in a shift. The same thing holds true for your crew. If they set a new tonnage record, go a long time without an accident or map out an improvement in the face cycle, show your appreciation in a way that will make them want to do even better. That builds teamwork.

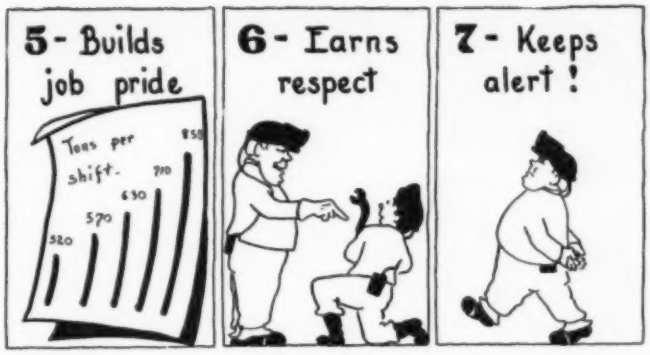
EARNING RESPECT AND LOYALTY—Be a leader, not a pusher, but be careful not to get so far ahead of your men that they can't follow you. That is, size up their abilities and skill and then set a goal that challenges the best they've got. A good leader stays just the right distance ahead of his men. That is, he makes sure they know where he's going, why he wants to go and how he expects to get there. Also, he stays ahead of the needs and desires of his men, so they don't have to ask for the things they want and need.

Don't say "No" all the time. That makes workers resentful and keeps them from making suggestions. As pointed out earlier, if you give a little ground on small issues, you'll be able to take a stronger stand on important questions. Also, if you listen to suggestions, give credit when they're good and explain why if they have to be turned down, you may turn up a suggestion some day that will put your crew 'way out in front.

Never give a man reason to think he's "on your list." A coal mine is no place for carrying a grudge around. So, when you have to call a man down, tell him what it's all about, patiently, in words of one syllable. Don't keep him in the dark.

Be honest and frank with your men. Don't put them off with promises you have no authority to make and no intention of carrying out. If you can't do something they request, say so and tell why. If it's a request that goes beyond your authority but makes sense, offer to take it up with the superintendent or general manager. Also, admit your mistakes when you make them. It's always easy to blame somebody else, but your men will respect you if you take the blame instead of passing the buck.

If you try to please everybody, you'll finally wind up with a grumbling crew. It's a lot more important for your men to know they'll get fair treatment than to look for special favors. Pass the good jobs and the bad ones around equally. Base upgrading on the record, not



on your likes and dislikes. When you move a man up, explain why you recommended him and be prepared to explain to the other men why they were passed over if any of them ask you.

Don't let your men push you around. Don't give up control of your crew to the wise guy, the speed wizard, the crew bully or the sorehead. On the other hand, stand up for your men and see that they get all the breaks they deserve in working conditions, overtime, promotions and good equipment.

Don't be a grouch or a sourpuss and don't crawl all over a man when you get mad. Take time to cool off. Then you won't say something you may regret later. Show a friendly interest in your men. You can do this without being over-familiar and without undermining your position as captain of the team.

Keep your men moving up the ladder. It isn't fair to hold a good man back just because you're afraid you can't find somebody else to do the job as well as he does it. Every time you move a good man up you show the others that good work pays off. Likewise, you make sure that when you move up, the men under you will make you look good.

Set a good example by staying on top of your own job. Be on time every day for work. Be fair and square. Show your own willingness to cooperate. Show respect for your superiors and for the men who work for you. Do your own job thoroughly, because no rules for success will work unless you work too.

STAYING ON YOUR OWN TOES—In relations with the front office, keep yourself informed about advance plans and changes. Accept changes whenever you're sure they mark an improvement. If you don't like a change that's coming up, state your objections, but if you're overruled, take your defeat gracefully and don't pull your punches when you pass it along to your men.

Don't try to bull your way through a debate in the front office or cover up your shortcomings with bluff. When you don't understand something, say so and ask your superior to explain it. When you make a mistake, admit and find out what you should have done.

Keep good records to guide you but don't get bogged down in details. Personnel records help you distribute work fairly among your men and size workers up for promotion. Accident records help you locate trouble spots and careless workers. Tonnage records, noting the down time and the causes, help you plan your work ahead and tell you where to expect most delays.

In handling questions that are within your authority, think for yourself. Don't blow into the superintendent's office with every little detail. Use your own judgment and initiative.

Finally, keep learning so you'll be ready for promotion when the time comes. There's a lot you can do along these lines, such as studying at home, reading good operating magazines, going to night school, taking correspondence courses, attending classes run by your company and your state mining department and keeping a close watch on your superiors.

All these things—self-improvement, earning your workers' respect and loyalty, self-training and the rest—will help you be a better boss. Is there any way to tell what headway you're making?

If you want to know how you're doing, measure your progress month by month by the following yardstick:

1. Complaints and grievances in your crew. The fewer of these you have, the better foreman you are.

2. Firings and transfers from your crew. Too many firings show you're acting too hastily and haven't got the key to good discipline. Lots of transfer requests suggest there's a weakness somewhere in the way you handle your men.

3. Down time. When your idle time gets shorter, your scheduling is improving and you're getting good maintenance.

4. Tonnage. Output that goes up every month shows that a boss and his crew are teamed up well.

5. Accidents. A good safety record means you've got the hang of keeping your men safety-conscious.

6. Absenteeism. If your men come to work on time every working day and stay through until quitting time, you can believe they like their jobs and respect their foreman.

7. Promotions your men earn. Whenever one of your men moves up to a better job, he owes it partly to you because you've trained him well and set a good example of loyalty and dependability.

8. Mistakes. Poor instruction and loose discipline cause a lot of mistakes. When mistakes go down, the foreman's rating goes up.

9. Quarrels in your crew. If your men scrap among themselves, look back to see if you've been playing favorites or passing off complaints. A contented, smooth-working crew marks you as a good leader and a fair-minded boss.

10. Your own promotions. Your superiors will recommend you for a bigger job when you deserve it. Measure the success of your foremanship by the speed of your own movement toward the top.

What's ahead for a better boss? Are the rewards really worth working for? A good foreman can look forward to a still better job, a bigger paycheck at the end of the month, more security for himself and his family and the real satisfaction that comes from reaching a desirable goal. Most men agree that these things are really worth while.

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BATTERY-POWERED TIMBERING MACHINE on its way into a working place pulls a semi-trailer loaded with crossbars and posts sufficient for half a shift for one crew. Installation of the timbering units permitted cutting crew size from 17 to 14 men.

Consol Mechanizes Timbering

Battery-Powered Timbering Machines Equipped With Semi-Trailers Cut Cost at Least 50% and Reduce Hazards at Consolidation Coal Co. (W. Va.)—Supply Units Eliminate Manual Timber Handling—Crew Size Reduced

TWO-WHEELED SEMI-TRAILER for timber haulage is pulled by the timbering machine and has a two-way seat and steering wheel at the rear (left).

By J. H. EDWARDS
Associate Editor, Coal Age

A REDUCTION OF AT LEAST 50% in the labor cost of timbering and the elimination of several hazards have been achieved by the Consolidation Coal Co. (W. Va.) with battery-powered permissible timbering machines and semi-trailers. These are now standard equipment for shuttle-car sections in the company's Fairmont Division mines. Eighteen timbering machines are now in use. Seventeen were installed this past winter, following a year of continuous service from the initial machine. That experience also pointed the way to a simplified method of transporting timbers.

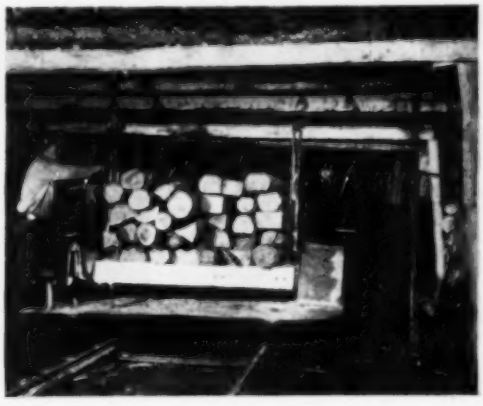
With the new units, a crew of

From Surface to Face—Mechanical Handling Cuts Labor—Speeds Operation

1 TIMBER FOR HALF A SECTION SHIFT—18 crossbars and 36 posts—is taken into the mine on a track-type timber truck.

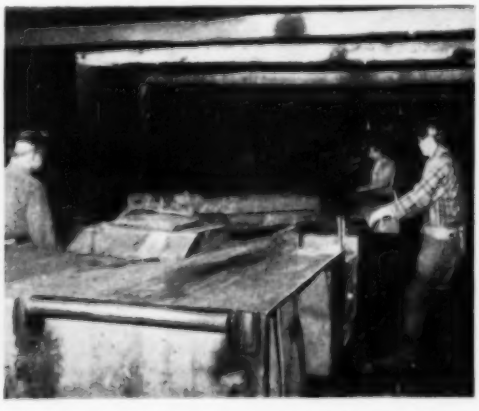
2 AT THE SECTION TRANSFER STATION, lifting bars under ends of the load hoist the bundle 2 in above the track truck.

3 TIMBER REMAINS SUSPENDED until arrival of the semi-trailer, coupled to the timbering machine throughout the shift.



4 WITH SEMI-TRAILER IN PLACE, timber bundle is lowered onto its bed for haulage to working places.

5 MANEUVERING IN THE WORKING PLACE, the timber trailer is steered by a crew member from its rear end.



AS THE FIRST STEP in setting a crossbar, the bar is rolled across the machine bed onto the boom saddle.

three men timbers 13 to 25 working places yielding 450 to 900 tons per shift. One timberman, however, is a change-over man for operating other face production equipment through a staggered lunch period. Before installation of the timbering machines and semi-trailers, it required six men to timber for one loading unit. Now, 14 men, including the foreman, comprise a unit crew, as compared to 17 men formerly. In addition, the hazard of falling crossbars is eliminated, men are not required to do heavy lifting and very little work under unprotected roof is necessary.

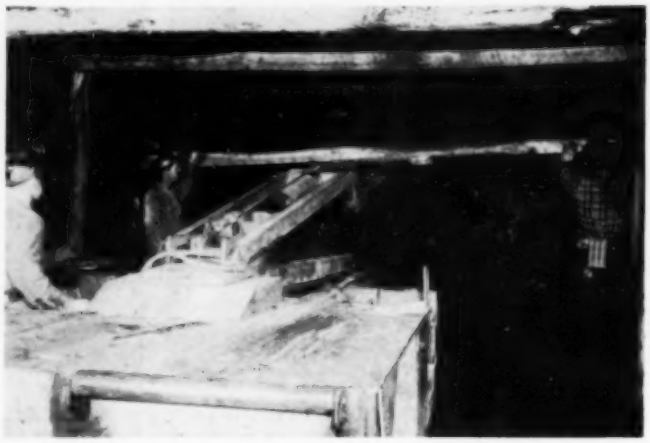
Two Crossbars Set Per Cut

The Pittsburgh seam being mined ranges from 84 to 108 in thick. Working height is less, however, since 12 to 18 in of top coal is left to support the drawslate. Two crossbars are set per cut on approximately 4-ft centers. Consol's timbering machines, manufactured by the Baker-Raulang Co., Cleveland, and sold by J. H. Fletcher & Co., Huntington, W. Va., are high type with a centrally mounted boom that can raise timbers 8 to 9 ft. A machine with a front-mounted boom designed for low coal also is available from the manufacturer.

The semi-trailer, which remains coupled to the timbering machine during the shift, has but two wheels and is steered from a two-direction seat and steering wheel at the rear corner. This steering trailer was suggested by K. K. Kincell, superintendent, Mine No. 63, Monongah. The bed of the trailer is a skeleton structure with stakes and is just large enough to carry a bundle of posts and crossbars sufficient for a half shift.

Photographs accompanying this article, made in Mine No. 63, are typical of practices at the division's mines with main-line track haulage. In the timber yard on the surface, about 18 crossbars 14 ft long and 36 posts 8 ft long, supplying one crew half a shift, are loaded on a track-type timber truck and secured with load binders and chains permanently attached to the truck. Timber is piled on the truck in a specified manner so that the bundle will not exceed a certain width as judged from the truck bolsters.

At a transfer station in the section, the entire bundle is lifted about 2 in and the truck is pulled out to leave the bundle suspended. This station consists of two 5-in H-beams 14 ft long on Simplex jacks and lifting is done with four



7 BOOM RAISES THE CROSSBAR to the roof, where it is held in place with a 1,000-lb thrust until posts are cut and placed in position.

8 CROSSBAR IS HELD against the roof, while one man cleans the bottom and another saws a post to the right length. Saw arrangement eliminates swinging posts around.

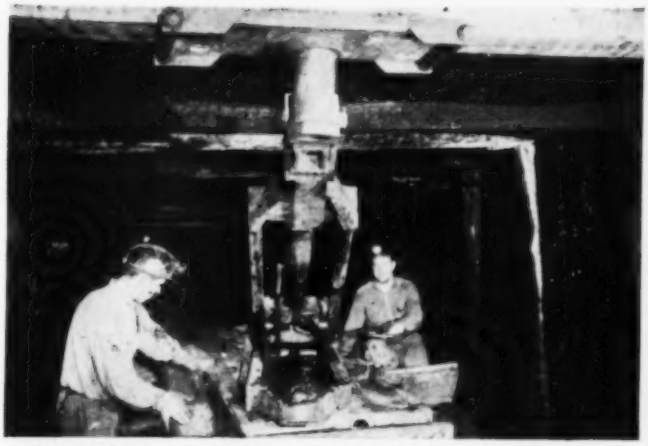
Yale 1½-ton "Pul-Lift" hoists.

At the beginning of a shift, the timbering machine backs its semi-trailer under the hanging bundle, which then is lowered onto the trailer frame between the retaining stakes. Lowering the bundle is the only labor the timbering crew must perform in the supply operation. Manual handling is limited to sliding timbers from the semi-trailer onto the timbering machine.

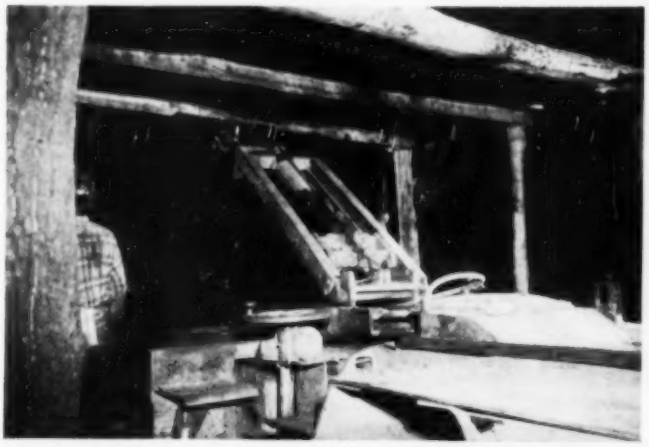
Over-all height of the Baker-Raulang timbering machine—a four-wheel unit with two-wheel drive and two-wheel steer—is 46 in. It is 84 in wide and 133 in long, plus an additional 48 in when the boom is horizontal for traveling. Tires are 7.50x15 and the unit has a road clearance of 10 in. Dual wheels are used on the drive axle.

Capacity of the 48-volt Gould battery is 350 amp-hr, ample for a shift. Tramming speed unloaded is 5.5 mph; with a 3-ton trailing load, 4.2; with 5-ton load, 4 mph. Rated continuous drawbar pull is 450 lb and the maximum for starting is 3,000 lb. Weight of the machine, including its 2,200-lb battery, is 11,595 lb. The boom's lifting capacity is rated at 1,000 lb.

The 24-in saw cuts crosswise to the machine's length—an arrangement that eliminates swinging the post to be cut from its normal longitudinal position and permits cutting of long crossbars if that is necessary. The saw, normally below



9 PROPERLY CUT, the post is slid forward across rollers on the two machines for setting under the crossbar. Rollers minimize physical labor in handling timber.



10 WITH THE POST IN PLACE on the right, a post for the left side is cut and placed and the machine boom lowered to complete the timbering-machine cycle.

MANAGEMENT ON THE JOB at Mine No. 63—Geo. C. Cain (left), general mine foreman, K. K. Kincell, superintendent, and Ralph Mick, section foreman. The 2-in plastic pipe hanging on the rib serves as a gathering-pump discharge.

the deck, is advanced upward by hydraulic equipment and the "hold" control is positioned to keep the operator away from the saw.

A wire-rope-pantographic device keeps the boom saddle level as the crossbar is hoisted. The boom unit can be moved forward or backward up to 30 in by hydraulic control. Therefore, it is unnecessary to tram the machine while setting a crossbar.

Physical Labor Minimized

A minimum of physical labor is involved in taking a crossbar from the semi-trailer and placing it in position against the roof ready for the posts. Sliding the crossbar from the semi-trailer over the deck of the machine into the saddle of the boom is facilitated by a roller at the back edge of the machine deck, another on the front end and one at each end of the saddle.

If a safety post in the working place is positioned 12 in or so off center, it need not be disturbed in setting the first crossbar, since the boom and saddle can be manipulated to swing the crossbar around in back of it.

Before installation of the machines, operating and maintenance supervisors at each mine were schooled in battery maintenance. Classes at the mines were taught by Sam Pellerite, electrical engineer working out of the office of George Henderson, division superintendent of maintenance. Before instructing the classes, Mr. Pellerite himself attended a one-week school conducted by the Gould Battery Co., Trenton, N. J.

Charging stations are kept as close as possible to working places and are ventilated by separate splits. Batteries are changed by sliding them onto benches. Timbering-machine crews move the charging stations and can set one up in two man-hours. The section mechanic puts the benched battery on charge and the automatic equipment finishes the job. One spare battery is provided per machine.

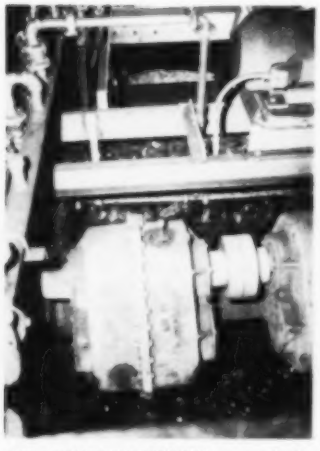
As compared to trailing-cable power, battery power for the timbering machines has been found to offer a great advantage in flexibility, especially where shuttle cars, as well as loading, cutting and drilling machines, have trailing cables.

In the Fairmont Division, G. R. Higinbotham is vice president of operations, Geo. W. McCaa is general superintendent of southern mines, and W. B. Wickey is general superintendent of northern mines.

WITH HIGH CAPACITY IN A SMALL SPACE, the Park custom-cleaning plant uses heavy-media for separating coal and refuse. Ability to change gravity at will with precise cleaning at any level is expected to extend the mining range.

Park Heavy-Media Plant

Processing Egg to Rice, New Park Custom Breaker Uses Heavy Media for Precision Cleaning and a High Degree of Flexibility—Ability to Clean Marginal Coals Expected to Materially Increase Mining Range

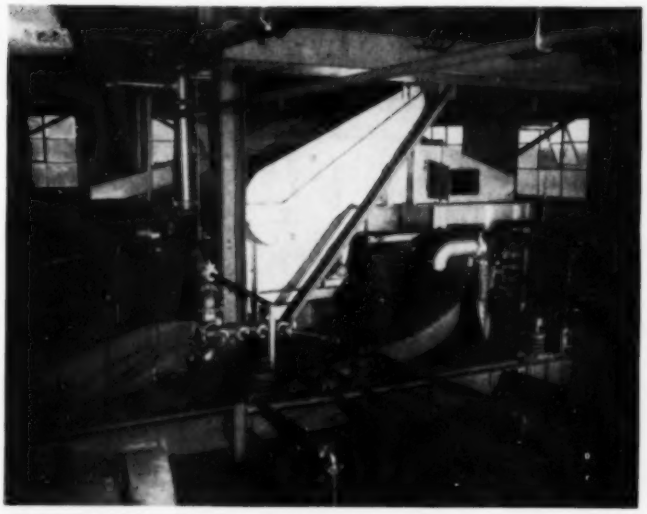


TWO VIBRATING SCREENS remove barley and smaller from the raw feed to the plant. These are recovered in a classifier (right) for loading.

FIRST IN THE ANTHRACITE REGION, the new Park heavy-media plant built for the Rhoads Contracting Co., Park Place, Mahanoy City, Pa., features precision cleaning with a high degree of flexibility in the choice of specific gravities. The latter was a major consideration in the selection of this particular process, since the installation will be operated as an independent custom processing plant and, therefore, will find it necessary to adjust gravity to fit specific coal and cleaning problems. The plant is designed to process egg, stove, nut, pea, No. 1 buckwheat and rice, which are shipped by rail to other plants for final sizing and loading.

Rated capacity of the installation, designed and built by Link-Belt, is 160 tons of feed per hour through the cleaning vessel. However, with a difficult coal, the vessel has been operated at rates 50% over design, with no appreciable effect on cleaning results. Compactness is another outstanding feature, the capacity being achieved in a structure only 70 ft high and occupying a ground space of only 36x54 ft. An operator and helper run the plant with consequent saving in labor cost.

Over and above the other advantages previously enumerated, the plant is expected to be of real bene-



HEART OF THE PARK HEAVY-MEDIA PLANT is the float-and-sink concentrator (rear). Magnetite is removed from the cleaned coal and refuse on vibrating screens (foreground).

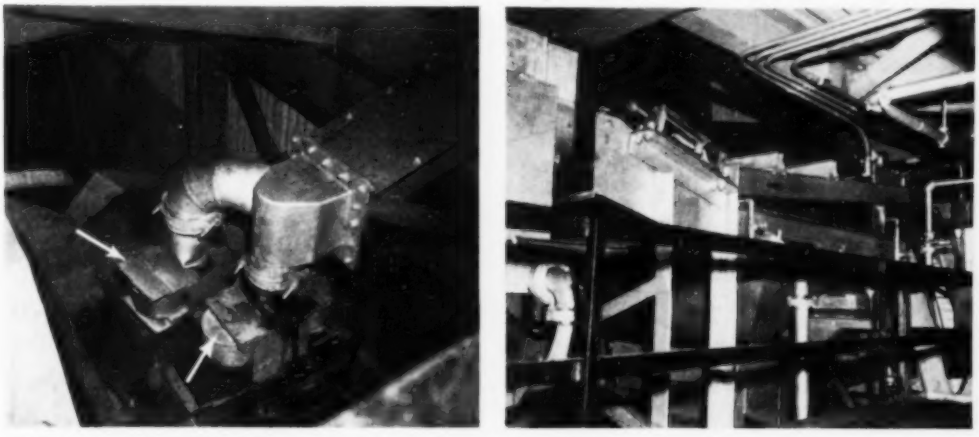
fit from the mining standpoint. In other words, because of its ability to make a sharp separation at any desired gravity and because of its high capacity in a small space, plus low cost for operating labor, it will permit economical cleaning of marginal deep-mined coals, lean culm banks and high-refuse strip production, thus materially expanding mining opportunities.

The plant presently is operating on deep and strip coal from the Buck Mountain, Seven-Foot, Mammoth and Holmes veins. The feed contains a large percentage of bony material of nearly the same gravity as the coal and thus poses a difficult cleaning problem. Recovery, on the basis of total feed to the plant, is 50 to 60%. Recovery in the sizes actually cleaned is one-half to two-thirds of the feed to the cleaning vessel, depending upon the source at any particular time. Ash in the cleaned coal runs consistently close to the desired percentages in all sizes.

The heavy-media plant is preceded by a rough cleaner to which the raw coal is delivered by rail and truck. From the dump hopper the coal goes over a fixed grate-type screen taking out minus-3-in, which is chuted directly to the feed conveyor preceding the heavy-media plant. Plus-3-in goes to bull-shakers, which take out minus-6-in material. This minus-6-in goes to the No. 3 rolls, bypassing the picking table for plus-6-in which, after picking, goes into the No. 1 rolls. The No. 1 roll product, after passing over a grate with 3-in openings, joins the minus-6-in in the No. 2 rolls. In the final pass through the No. 2 rolls, therefore, the raw coal is reduced to a top size of approximately 4⅜ in before going onto a 9x48-in scraper line elevating it to the top of the heavy-media plant.

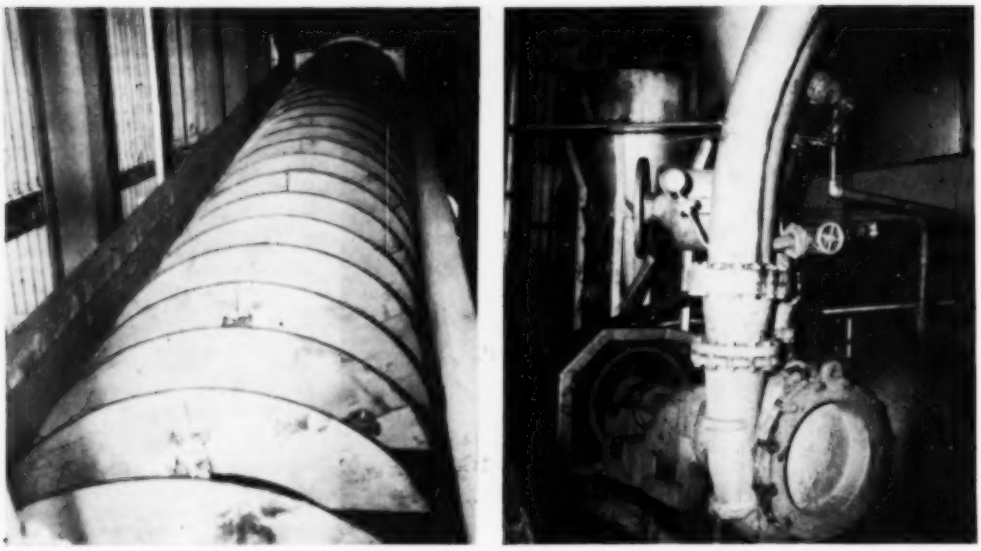
In the top of the plant the raw feed is split between chutes feeding two 6x16-ft double-deck Allis-Chalmers Low-Head screens. The feed ends on the top decks are jacketed with 4-ft. sections of 1-in square-mesh cloth, followed by three sections of ¾-in-square. The bottom decks are jacketed with one section of Tyrod stainless cloth (0.125x2 1/16-in slotted openings) and three sections of 0.128-in-square stainless. The top decks are equipped with dams designed by the plant staff, headed by H. H. Finton, to hold the coal back and turn it over. These dams are made from 3x3 angles, as shown in an accompanying illustration. Dams of plain 1x1 angles are installed on the bottom decks.

Fine coal through the bottom decks, as shown in the accompanying flowsheet, is discharged directly

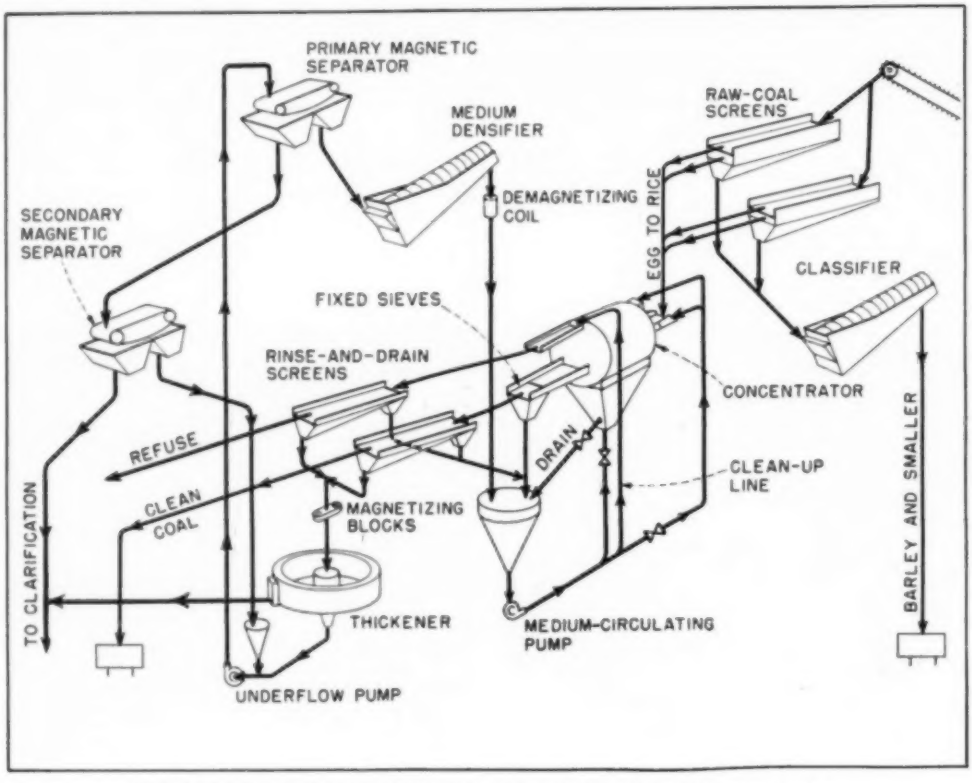


FIRST STEP IN MAGNETITE RECOVERY is collection in a thickener (left), preceded by magnetizing blocks (arrows). A primary magnetic separator (right), backed up by a secondary unit (not shown), removes the magnetite from the water.

Park Plant Designed for Flexibility and Precision Results



DENSIFICATION in the spiral at the left follows magnetite recovery. From the densifier, the medium is returned to the system through a demagnetizing coil. At the right is the media-circulating pump, with the underflow pump to the magnetic separator in the rear.



SIMPLICITY AND STRAIGHT-LINE OPERATION are major features of the Park heavy-media plant.

Typical Operating Results, Park Heavy-Media Plant

CLEANED COAL—TEST GRAVITY, 1.720

	Percent Size	Float	Sink	Percent Sink in Size	Percent Ash in Float
Egg and larger	31.75	31.25	0.50	1.57	9.88
Stove	19.00	18.50	0.50	2.63	8.08
Nut	20.50	19.75	0.75	3.66	9.48
Pea	6.50	6.25	0.25	3.85	10.06
No. 1 buck	10.25	9.75	0.50	4.88	9.68
Rice	6.75	6.25	0.50	7.41	11.74
Smaller	5.25	3.50	1.75	...	...
Totals	100.00	95.25	4.75	...	...

REJECTS—TEST GRAVITY, 1.720

	Percent Size	Float	Sink	Percent Float in Size	Percent Ash in Float
Egg and larger	29.50	...	29.50	...	...
Stove	15.50	...	15.50	...	...
Nut	20.25	0.50	19.75	2.47	19.48
Pea	11.25	0.50	10.75	4.44	24.28
No. 1 buck	14.50	0.50	14.00	3.45	27.94
Rice	4.75	0.25	4.50	5.26	17.10
Smaller	4.25	0.50	3.75	...	...
Totals	100.00	2.25	97.75	...	...

to a 48-in Wemco spiral classifier and then goes to railroad cars for preparation at other plants.

Coal over the top and bottom decks of the raw-coal vibrators is chuted to the cleaning vessel—a Link-Belt Float-Sink Concentrator. The cleaning medium is ground magnetite suspended in water. Approximately 83% of the magnetite is magnetic material, with 1 to 3% plus-100-mesh and approximately 70% minus-325-mesh. Consumption ranges from ½ to ¾ lb per ton of material processed.

Concentrator Operation

The coal floats on the medium across the vessel to the discharge opening. Refuse sinks and is caught in the flights of a rotating elevator with perforated lifter shelves, which carries it up and discharges it to a chute or launder in the top of the vessel. Medium run into the launder carries the refuse to a rinse-and-drain screen, where the first step in the process of magnetite recovery and re-use takes place. A similar rinse-and-drain screen receives the cleaned coal, which then is chuted to railroad cars for shipment to other plants for sizing and loading.

The rinse-and-drain screens also are 6x16-ft Low-Head units. The clean-coal unit is preceded by fixed drain sieves of Hendrick ½-mm-opening Wedge-Slot stainless screen. Both vibrating screens are jacketed with stainless-steel cloth—0.045x⅜-in slotted openings, 0.060-in diameter wire, long openings parallel to the screens. Protection is provided by ¾x9-in cloths, 9 in center-to-center triple-chute wires, ¼-in spring steel, with long openings parallel. Weir-type sprays are installed on both the refuse and clean-coal screens.

Medium Recovery

Water carrying fines and magnetite go through magnetizing blocks into a Link-Belt thickener 16 ft in diameter and 6 ft deep. The function of the magnetizing blocks is to achieve magnetic flocculation of the magnetic particles to increase the settling rate. Underflow from the thickener goes to a 4x4 Goyne sludge-type underflow pump, which elevates it to a 48-in Dings magnetic separator (see accompanying illustration). In this separator a magnet supplied with direct current by a motor-generator set pulls the magnetite out of the water onto the underside of a belt. When the belt travels beyond the magnetic field, part of magnetite drops off and the remainder is removed by spraying to a chute leading to a 48-in Wemco spiral classifier, or densifier.

The densifier concentrates the magnetite, which is discharged through a demagnetizing coil to the medium sump. This sump, as shown in the flowsheet, also receives water and medium from the feed-end sections of the rinse-and-drain screens and from the fixed sieves preceding the clean-coal screens. Fresh water also is added directly to the sump to permit final adjustment of gravity. From the sump the medium is recirculated by an 8x10 Goyne sludge-type circulating pump, being split between the vessel and the refuse chute. In the latter case its function is to float the refuse along.

The practice is to drain the vessel into the circulating sump at the end of each shift, which provides an opportunity for cleaning the medium. Dumping is accomplished by valve manipulation and the medium is pumped around through the magnetic separator until the desired degree of cleanness is secured. A secondary magnetic separator follows the first, as shown in the flowsheet, to insure maximum magnetite recovery. Magnetite from the secondary separator flows to a small sump preceding the underflow pump for recirculation, while the coal end, along with the thickener overflow, goes to silt dams for clarification.

A small air compressor is installed to put air into the medium recirculating sump automatically during the off-shift hours when the medium has been dumped from the concentrator. Circulating air through the sump keeps the medium from packing solidly, and thus permits starting in a few minutes when work is resumed on the next operating shift.

Power Equipment

The Park heavy-media plant is operated by a total of 19 motors, excluding the fresh-water pump (200 hp). The motors range in size from ¼ to 100 hp. Total connected horsepower is 287½. Both General Electric and Allis-Chalmers motors are employed, with Cutler-Hammer controls arranged for sequence starting. Practically all drives are of the Link-Belt ElectroFluid type with integral reduction gears.

Operating gravity at the time this article was prepared was 1.73, which is maintained almost without exception during the operating shift. Readings made at 15-min intervals normally show only two to four deviations of, as a rule, not more than a hundredth up or down in a day.

With the difficult coal being processed, typical results were as summarized in the table appearing at the top of this page.

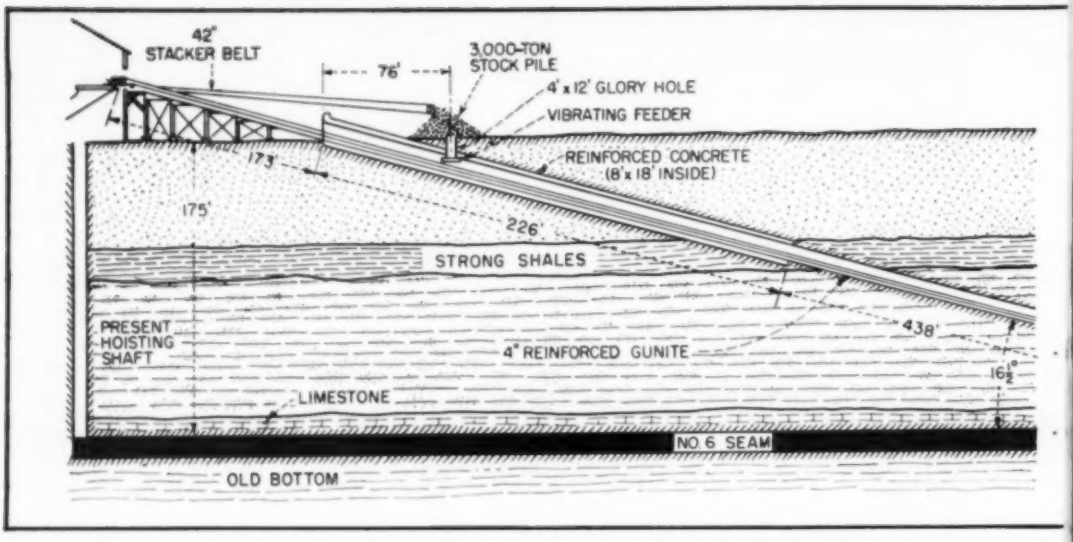
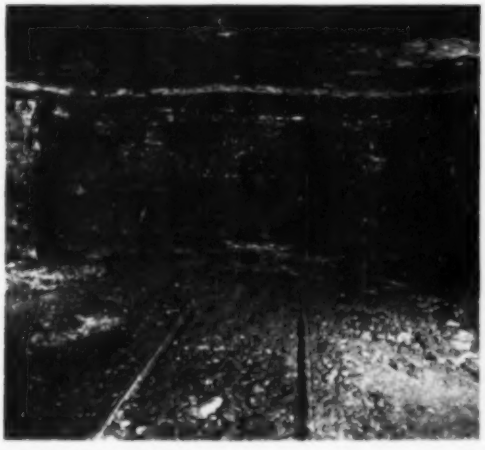


FIG. 1—LAYOUT OF THE NEW SLOPE being opened at the St. Ellen mine of the Perry Coal Co. to solve a hoisting bottleneck. Coal from down or running below washer capacity, coal will be fed from the stockpile through the glory hole onto the slope belt for return to the tipple.

New Slope Cushions Output

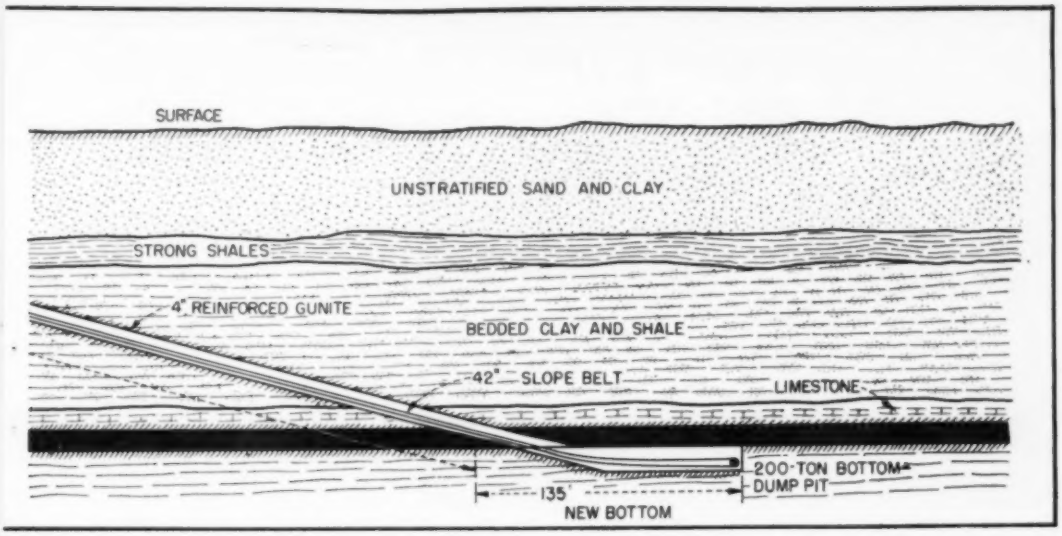
New 664-Ft Belt Slope at St. Ellen Mine Will Eliminate Hoisting Bottleneck and Permit Independent Mine and Washer Operation—Excess Tonnage Stockpiled Outside for Future Use—New Haulage and Face Units Planned

By WILLIAM BOLT
Superintendent
St. Ellen Mine
Perry Coal Co.
O'Fallon, Ill.



LOADING AN 8-FT CUT has just been completed in this room. Track is kept even by alternating one 8-ft rail from side to side with a standard 16-ft rail.

TRACK-MOUNTED CUTTING MACHINES at St. Ellen mine are coupled to 500-gal tank cars mounting a high-pressure centrifugal pump and motor, for supplying the two cutter-bar sprays.



the 42-in slope belt in excess of washer capacity will be delivered by the stacker belt to the 3,000-ton outside stockpile. When the mine is New 200-ton dump pit will receive coal in mine cars directly from sections, thus eliminating present transfer station and hoisting shaft.

ELIMINATION of the present hoisting shaft and driving of a new 664-ft belt slope are among the major alterations now under way at the St. Ellen mine of the Perry Coal Co., O'Fallon, Ill., to provide a 3,000-ton cushion between the face and the washer. When the improvements are completed next spring, either the washer or the mine can operate for eight hours at full capacity independently of the other. At present, there is no tonnage cushion to absorb delays between the hoisting bottom and the washer, and only the mine-car capacity between the face and the bottom. Mining the No. 6 seam, this operation, opened in 1903, has a 4-mile haul from the face.

The new 664-ft 16-deg 30-min slope from portal to the coal is being driven from a new bottom and will be equipped with a 972-ft 42-in belt conveyor to transport the coal from a 200-ton bin at the bottom into the tipple. An overflow belt from the tipple to outside storage will stockpile 3,000 tons of raw coal when necessary. The mine will stockpile if the washer is down, and the washer will draw from the stockpile when the mine is down (Fig. 1).

St. Ellen mine now is averaging 2,300 tons of raw coal per shift with a 15% reject. This tonnage is being obtained with four producing units on the day shift and one on the night shift.

Each section unit now consists of a Goodman Type 360 track loader, three Goodman 6-ton locomotives, each pulling three 8-ton drop-bottom cars, CP No. 473 post-mounted drills and the part time services of a Goodman Type 324 track-mounted cutting machine. Three cutting machines, equipped with Goodman or Cincinnati chains, each averaging 17 places per shift, cut for the four loaders. Both American Car & Foundry and Sanford-Day mine cars are in use and are Timken-bearing equipped.

A spare Type 360 loader, with another Type 324 cutting machine on order, will fill out a fifth producing unit when the new slope is completed and raise total capacity to approximately 3,000 tons of clean coal per shift. There also are 10 8-ton gathering locomotives on order to replace the present 6-ton units, and the post-mounted drills are being replaced with new track-

TRACK-MOUNTED LOADING MACHINE turning a 45-deg room. Mining 24-ft-wide rooms in a keyroom system, the 21-man crews average 500 tons per shift and are expected to increase output considerably when the new slope, haulage and face equipment is installed.

New St. Ellen Slope Will Permit Increased Efficiency and Tonnages

SURFACE PORTAL of the new 664-ft belt slope now under construction at St. Ellen to provide a 3,000-ton cushion between mine and washer. The slope is lined with reinforced concrete 226 ft from the surface to the solid rock.

AT THE BOTTOM OF THE NEW SLOPE being driven with a duckbill up to meet the part excavated from the surface. Rock discharged by the shaker conveyor is loaded by a crawler-mounted loading machine into a shuttle car for stowing in old workings nearby.

mounted radial two-arm drills on order.

The No. 6 seam of the Illinois series averages 7½ ft in thickness at St. Ellen. It is quite consistent but at times varies from a minimum of 6 ft to a maximum of 11 ft, although either of these extremes is rare. The seam is generally level, with some 3 to 4% grades, and local dips of 7 to 8% are occasionally encountered.

The seam lies under 150 to 200 ft of sand, clays and shales and 20 to 30 ft of limestone. The top is a strong sandy limestone. There is 60 in of comparatively clean top coal between the limestone and blue band, a hard pyritic slate ½ to 1 in thick and about 30 in above the bottom. Below the blue band are some pyrite and clay partings, each from 0 to ½ in thick. The kerf is cut just above the blue band. The bottom is soft, dry fireclay, which is badly chewed up by crawler-type equipment. To avoid loading fireclay, a loader on which the head can be easily manipulated must be used.

The mining plan is based on the keyroom system, in which keyrooms are turned off room entries at 45 deg on 80-ft centers (Fig. 2). Rooms then are turned off each keyroom at 45 deg to the right and left on 80-ft centers to intersect with rooms driven right and left off adjacent keyrooms. All rooms are 24 ft wide and entries 20 ft wide. Main headings utilize a six-heading system and rooms are opened from a double-heading panel.

This mining plan permits a 55% total recovery. It is so designed that no turns are required, except those from the switches. Switches are spaced so that only standard 16-ft rail is used between them.

Rooms are advanced 8 ft per cut. To start the face cycle after a room is loaded out, the drill operators first drill the required nine holes (Fig. 3). The timbermen then set two posts on each side of the track, or more if heavy top is encountered. The trackmen advance the track to within about 5 ft of the face and track is kept even at the face by the use of one 8-ft rail, which is alternated from side to side with a standard 16-ft rail. The inby 8 ft of track is laid on four steel ties, which are replaced with wood ties as the track is moved ahead. Steel ties and switches are supplied by West Virginia Steel & Mfg. Co. The place then is cut 30 in above the bottom and 8 ft deep. Holes are charged with Big Red No. 7 and fired at the end of the shift. Then, the cut loaded out on the next shift.

To provide water for dust control, each cutting machine is coupled to a 500-gal tank car equipped with a high-pressure centrifugal pump driven by an independent motor, both of which are mounted on the tank car. A hose from the pump connects to two sprays at the rear of the cutter-bar. Each place requires 20 gal of water or 300 gal per shift per machine.

Each loader is presently serviced by three small locomotives pulling trips of three 8-ton cars. After the cars are loaded, the motor takes its trip to the transfer station serving all four sections, where the bottom-dump cars are emptied into a 40-ton under-track bin. The trip then returns to the section.

At the transfer station, a double chain conveyor in the bottom of the 40-ton bin moves the coal to one end of the bin and discharges it onto another double chain conveyor, which elevates and transfers the coal to the top of the parallel head-

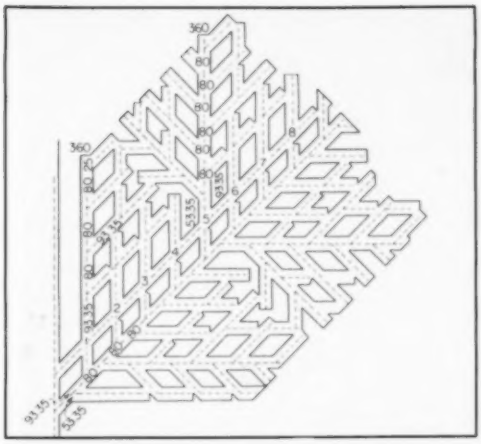


FIG. 2—MINING AT ST. ELLEN is based on the keyroom system, with keyrooms turned off room entries at 45 deg on 80-ft centers. Other rooms turned right and left off the keyrooms intersect rooms driven from adjacent keyrooms.

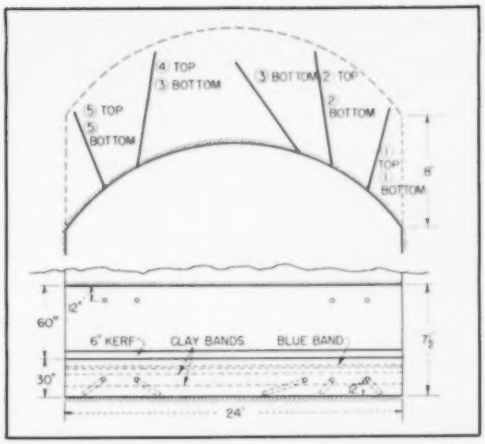


FIG. 3—THE DRILLING PLAN calls for nine holes for an 8-ft-deep 24-ft-wide cut. Below the blue band—a hard pyritic slate ½ to 1 in thick—there are some pyrite and clay partings, each up to ½ in thick. Top is a strong sandy limestone.

ing. The coal is here discharged into 54-car trips (2.8-ton cars) for the main haul to the bottom, from which they now are hoisted.

Main-line haulage now consists of two 13-ton locomotives. Two 20-ton locomotives, which will pull trips of 21 8-ton cars, are on order for the new haulage set-up. Under the proposed plan, 170 8-ton drop-bottom cars will transport the coal directly from the loader sections to a new bin at the bottom of the new hoisting slope, and the present transfer station will be eliminated.

The 21-man section crews now average about 500 tons per shift and consist of the following, in addition to a foreman: loader operator and helper, three motormen, two tripriders, two timbermen, four drillers, one-half machine operator and helper, shotfirer and five trackmen.

It is expected that the output of the section crews will be considerably improved with (1) the addition of the new-type drills, since drilling now is a bottleneck in the sections; (2) the elimination of the transfer station to provide an ample supply of cars in the sections; and (3) the utilization of the faster 8-ton gathering locomotives replacing the present 6-ton equipment. The crews also recover material from the worked-out rooms and sections.

At present, the only tonnage cushion between the face and the washer is mine-car capacity. As the first step in alleviating this condition, in which any delay is reflected at the washer, the 8-ton cars will be brought directly from the loader section to the 200-ton under-track bin of the new slope. The coal then will be transported by the slope belt directly to the three-cell jig-type washer having a capacity of 450 tph. If the discharge of the slope belt exceeds washer capacity, the excess will be transferred to a stacker belt, which will stockpile up to 3,000 tons on the ground directly over the new slope. This stockpile will be worked by the washer when flow from the slope belt runs below washer capacity. All coal is crushed to 7 in. The total mine production from 0 to 7 in is washed. The plus-½-mm size is recovered on dewatering screens.

The new slope being driven on a pitch of 16 deg 30 min will be 8 ft high by 18 ft wide inside. It will contain the 42-in slope belt, a supply track and manway, and will be 664 ft long from the coal to the portal. The surface was excavated to the solid rock and 226 ft of reinforced concrete poured from the surface. The top and floor of this section are each 36 in thick, with sidewalls varying from 12 in at the portal to 18 in at the rock. The remaining 438 ft to the coal is being driven up from the bottom with a Goodman G-20 shaker conveyor, Size 3 troughing, and a Goodman Type E-3 duckbill.

The rock discharged by the shaker conveyor at the bottom of the slope is loaded by a Joy 11BU crawler-mounted loading machine onto a shuttle car that stows the waste in old workings near the new bottom. The six-man crew driving the slope, including the foreman, can drill, shoot and load out an 8-ft round in seven hours, providing no heavy timbering is required. Considerable heavy top has been encountered in cutting across the weak shales and clays above the limestone. It is necessary, in places, to hold these sections with 12-in H-beams set on 12-in steel legs on 5-ft centers. The slope from the coal to the reinforced concrete will be protected by 4 in of reinforced gunite. The 200-ton dump bin is located 135 ft from the bottom of the slope.

The new slope belt conveyor will be on 972-ft centers, with a belt speed of 400 fpm and a capacity of 500 tph. An overflow stacker belt conveyor of the same capacity will be installed to handle all the discharge from the main slope belt that the washer cannot process at any one time. This stacker belt will stockpile up to 3,000 tons of overflow raw coal in a pile centered 76 ft back of the slope portal. At this center point, a 4x12-ft vertical chute from the top of the slope structure to the surface will permit feeding the stacked raw coal by gravity onto the main slope conveyor for return to the tipple. Coal from the glory hole will be fed onto the main slope belt with a vibrating feeder. Edge coal in the surface stockpile will be bulldozed to the chute. The slope belt will be powered by a 200-hp motor, with an auxiliary 50-hp motor for handling the man-trip.

TRIP SNAPPED IN MOTION while being pulled forward to change cars without stopping the belt. The car bodies overlap about 3 in with all slack out of the automatic couplers, which promotes safety when cars must be separated.

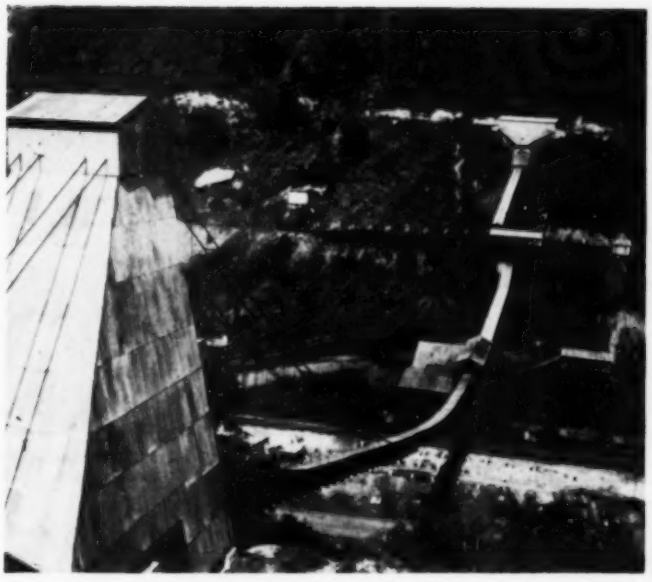
Overlapping Mine Cars

Trip Loading From Non-Stop Conveyors Without Spillage Achieved by Overlapping Mine-Car Ends at Pioneer and Black Star—Greater Safety Attained With Increase in Capacity and a Saving in Development Work

MINE CARS specially designed to prevent spillage when receiving coal from non-stop conveyors were put into use by the Pioneer Coal Co., Kettle Island, Bell County, Ky., early in 1938. As a result, this new-type car has become standard for that company and for the Black

A 15-CAR TRIP is in effect a 90-ton load. Developed by Fred W. Stout, then superintendent, the overlapping mine car was first installed by the Pioneer Coal Co., Kettle Island, Ky., in 1938. It is now standard for both Pioneer and Black Star.

C. B. BURCHFIELD (left), general manager for Pioneer and Black Star, and FRED W. STOUT, developer of the overlapping cars.



ALVA TIPPLE from the No. 4 headhouse. The suspended conveyor in the foreground carries a 48-in belt 500 ft long between centers.

Star Coal Corp., Alva, Harlan County, Ky., both owned by the same interests and managed by C. B. Burchfield. The design centers around overlapping ends on drop-bottom-type cars dumped as a trip without uncoupling. Therefore, a trip of, say, 15 6-ton cars constitutes, in effect, one 90-ton mine car.

Mr. Burchfield credits Fred W. Stout, now with the U. S. Bureau of Mines and residing at Knoxville, Tenn., with originating the idea of the overlapping cars and persuading officials of the coal company to give it a trial. Mr. Stout was at that time superintendent of the Pioneer mine. The cars are Sanford-Day "Automatics" with S-D "Floater" ball-bearing wheels and Willison automatic couplers.

Shuttle Cars Serve Loaders

At present 80 of the cars are in use at Pioneer and 100 at Black Star, where replacement of the old cars began in 1942. The accompanying photographs were made in Black Star No. 4 mine, which produces 1,300 tons daily (two underground shifts) from the 42-in Harlan seam. Loading in this section of the mine is done with Joy 14BU machines served by 2½-ton cable-reel shuttle cars delivering directly to the section belt via ramps.

The mine cars carry 6 tons and are 38 in high. The overlap, with all slack out of the couplings, is 3 in, which is sufficient to prevent practically all spillage, provided the spotting hoist is operating at medium to high speed. Uninterrupted operation of the belt while loading the 12 cars of a trip contributes materially toward an average production of 65 cars, or 390 tons, by a section crew of 26 men, including the foreman and boom man, or 15 tons per man-shift.

Belt Panels Driven 2,000 Ft

Rooms 32 ft wide on 48-ft centers are driven to a depth of 300 ft from the belt heading. Rooms on one side of the 2,000-ft panel are worked as the entry is advanced, while those on the other side are mined on retreat. Of the five headings constituting the panel entry, Nos. 1 and 2 (on the left) carry return air; the center, or belt, heading is about neutral; and Nos. 4 and 5 are intakes. Supplies are delivered to the shuttle-car ramps on the third, or off, shift.

Even though 20- and 13-ton locomotives are used on the main haul, the grade is so steep (5 to 6% in favor of the loads) that five skids are used under the wheels of 15-car trips. The mines are drift operations. At No. 4, the mine-car dump hopper near the portal can store 900 tons. Mine No. 5, across the valley and delivering to the same tipple, also has a storage bin. With these storage reserves, the tipple is operated but one shift.

Increased capacity of the individual mine cars is a valuable by-product of the overlapping-end design. Although, as now being handled, individual cars are not regularly coupled and uncoupled, the automatic coupler equipment takes care of the safety considerations, which are a factor even in infrequent coupling with the link-and-pin type requiring a man to reach in between cars.

Overlapping Reduces Delays

Still another advantage of the overlapping cars appears in certain stages of development of a mine or territory where there is no passway around the loading point and the empty trip is backed in past the loading boom and then pulled forward for loading. Where this is the condition, delay is minimized by starting the belt conveyor as soon as the first empty car starts back under the boom. The layer of coal the empty trip receives during backing is no disadvantage.

Kettle Island mine, where the first overlapping cars were installed, is in 36-in Straight Creek coal. Most of the production is hand-loaded from 50-ft faces onto shaker conveyors discharging to section belts, of which there are five in the mine.

When the first belts were installed in the mine in 1938, the reversible chain transfer had not been developed, or at least not been made available commercially. The overlapping mine car was Mr. Stout's answer to the vexing problem of how to avoid stopping the belt and shakers to change cars. In designing the new cars, it was necessary to consider clearance between overlapping ends when going around curves. The Sanford-Day design, which is standard for the two related companies, permits negotiating 50-ft-radius curves without the overlapping ends touching each other.

W. S. Speed was president of the Pioneer and Black Star companies at the time the new cars were installed. A. B. Hill now holds that position. H. S. Horton is superintendent of the Pioneer mine and R. L. Nichols is general superintendent of the Black Star mines at Alva.

FOLLOWING THE DRAGLINE, the 3½-yd shovel completes the cut, except for final cleaning up by the bulldozer. After initial operation proved pit life sufficient for installation of power, equipment was ordered to convert this unit from diesel to electric power.

Pitch Stripping in Alabama

Diesel Machines Prove Pits and Then Are Converted to Electric—Shovel Loads Part of Cut and Tractor-Mounted Loader Completes It—Coal Hauled Five Days From Pit and Three Days to Washer

PIT EQUIPMENT readily convertible from diesel to electric and vice versa is one of the modifications in practice worked out by G. C. McCullough, president, and R. F. McCullough, manager of coal stripping, McCullough Industries, Inc., Birmingham, Ala., to cope with the varying and difficult conditions encountered in Alabama open-pit operations. Others are loading pitching coal in two passes using two different machines, sidewall drills on turntable trailers and "no-delay" truck dumping to a feeder stockpile, where the coal is reloaded into semi-trailers for transportation to a washing plant.

In May, 1948, the company moved its equipment to a new pit five miles from Johns, in the southwest corner of Jefferson County at the Tusca-

PITS ARE OPENED ahead of the dragline and shovel by this tractor-scraper unit, which prepares a bench for the dragline to operate on. The shovel completes the operation by removing the bench, with help from a bulldozer.

THE 3-YD DRAGLINE with 70-ft boom being driven temporarily by a diesel engine, which was later replaced with an electric motor when power was brought into the mine.

loosa County line, to strip the outcrop of the top split of the Blue Creek seam. The split ranges from 2½ to 5 and averages 4 ft in thickness. On one side of the basin the pitch varies from nearly flat to 20%. On the other side, it may reach 85 deg. Only the flatter side is being stripped.

A Lima 1201 crawler-mounted dragline, with 70-ft boom and 3-yd Page "Automatic" bucket operated electrically at a former pit, was changed to diesel for opening the new pit. This permitted beginning work immediately without waiting for construction of a power line and transformer substation, and provided time for proving possibilities before deciding that the property promised a life that would make it pay to install purchased power. When experience indicated that an estimated four-year life could be realized, the power line and substation were installed and the original 2,300-volt power equipment was replaced in the dragline.

The second stripping unit is a Lima 1201 crawler-mounted shovel with 32-ft boom, 22-ft sticks and 3½-yd Amsco bucket. Equipment recently was ordered to convert it to electric drive also.

The terrain is rolling to hilly. Because the seam pitches down and the surface usually rises from the outcrop, the coal-bed width that can be recovered with the 60-ft highwall limit set for the present equipment averages about 100 and seldom exceeds 150 ft.

Cuts usually are opened by a unit consisting of a Caterpillar D8 tractor pulling a No. 70 scraper. This unit also is used for road building and miscellaneous dirt-moving jobs. The sidewall drills—one a McCarthy and the other a Hardsocg—are each mounted on a three-wheeled rubber-tired trailer, with the drill itself on a turn-table on top of the bed. This arrangement simplifies moving from one hole to the next by substituting a straightforward pull instead of a move involving backing and turning.

Holes generally are drilled in a soft shale. The hole size is 4½ in, the depth is 40 ft and the centers distance is 10 to 20 ft. The cover includes a 6-in to 3-ft stratum of sand rock about 8 ft above the coal in some places. DuPont dynamite is used and about one-third of the charge per hole—at the back end—is 60% strength. The remainder is 40%.

The dragline works ahead on the bench made by the scraper and casts its material to the limit of its reach. The shovel follows and casts inside next to the pit. A Caterpillar D7 bulldozer makes the final clean-up and, in pitching places, moves the material that the shovel leaves as its roadway.

In some sections of the pit the seam pitch is too great for the Marion 33-M crawler-mounted loading shovel, with ¾-yd Pettibone-Mulliken bucket, to get down on the bottom to take all the coal. Instead,

LOADING ON A 2- TO 3-DEG PITCH with a ¾-yd bucket. On steep pitches, loading is completed by a tractor-mounted unit.

THE DRILL TRAILER is pulled straight ahead from hole to hole. For longer moves the drill is swung parallel to the platform.

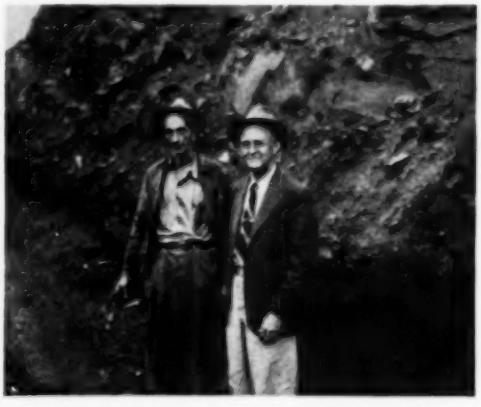
Special Loader and Dump Set-Up Facilitate McCullough Operation

R. F. McCULLOUGH (left) indicates seam pitch, estimated at 15 deg at this point and too steep for the loading shovel to work on the bottom. Where this is the condition, the tractor-mounted loader (right) is called in to complete the loading job.

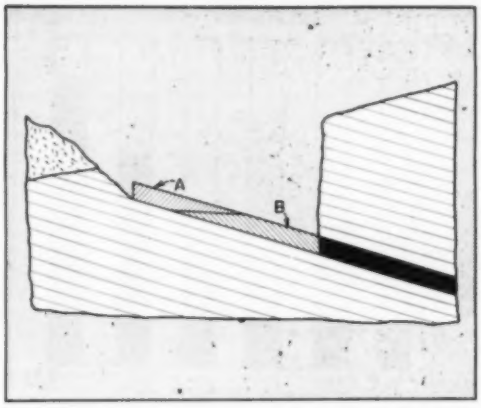
SUBSTITUTING for the regular bulldozer, then under repair, the tractor normally used for pit loading pushes coal from the dump and stockpile into the hopper for the belt elevating conveyor.

PIT TRUCKS DUMP IMMEDIATELY and the coal is bulldozed into the conveyor hopper, except on days the output is being hauled to the washer and a path has been cleared to the hopper.

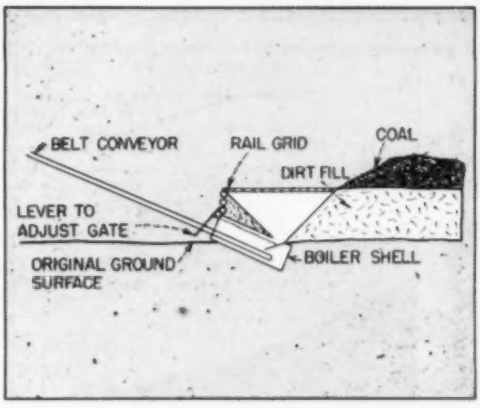
AN OLD BOILER SHELL serves as the tunnel for the belt elevating from the dump hopper to the vibrating screen.



J. D. STEWART (left), superintendent, McCullough Industries, Inc., and G. C. MILLER, assistant geologist, T.C., I. & R.R. Co.



WHERE THE PITCH IS STEEP, Portion A is loaded by the shovel and Portion B by the tractor-mounted loader.



PIT-HAULAGE TRUCKS dump the coal on filled ground. A bulldozer pushes it from this stockpile into the hopper.

TWO MEN PICK the plus-3-in on the lower end of a vibrating screen on top of the truck-loading bin. Coal is screened and hauled to the washer three days a week.

it leaves a horizontal or slightly sloping bench. Where this is the case, the remainder of the cut is loaded with a Traxcavator, made by the Trackson Co., Milwaukee, Wis. Its bucket is 6 ft wide and holds 2 yd. Mounted on a Caterpillar D7 tractor, it works readily on the pitching bottom and can load all the coal, including the low corner next to the highwall.

Pit Trucks Dump Without Delay

Pit haulage, now one mile, is done with six trucks, three of which are Hugs carrying 6 tons and the other three, Internationals taking 5 tons.

Equipment and methods of transferring the coal from pit trucks to semi-trailers for hauling to the washing plant provide for dumping of the pit trucks without delays, storage of the raw coal, hand picking, and storage of the picked coal.

A receiving hopper, with its top at ground level and covered with a grating of steel rails forming 10-in-square openings, feeds a belt conveyor. This conveyor elevates the coal to a single-deck vibrating screen, which takes out the minus-3-in to facilitate picking the rest. Two pickers are stationed at the lower end of the screen. The two sizes re-mix as they drop into the 20-ton steel bin from which the semi-trailers are loaded.

The shell of an old 72-in by 16-ft horizontal-return-tubular boiler, with one end cut out and a hole cut in the side near the other end, serves as the tunnel under the hopper to protect the lower end of the elevating belt. Only a shallow hole was necessary for the lower end of the shell. A dirt fill was made over and around it to support the sides of the truck dump hopper, to form a ramp and provide space for the stockpile.

When trucks cannot dump directly into the hopper they dump onto the filled ground. A Caterpillar D7 bulldozer later pushes the coal into the hopper. Large pieces of rock caught by the grating are thrown aside and any coal larger than 10 in is reduced by sledge or pick.

Part of Raw Coal Stockpiled

Three Fruehauf semi-trailers carrying 15 tons handle the five-mile haul, mostly over all-weather county road, to the washing plant, which can wash and prepare the coal at the rate of 125 tph. Capacity of the mine is geared to delivery of 900 tons per day, three days per week, to the washing plant. However, the pit loads and hauls 500 to 600 tons per day of eight hours, five days per week, to the raw coal stockpile. The washer operates on coal from an underground mine the rest of the week.

The company-owned automobile used by J. D. Stewart, superintendent of the mine, is equipped for mobile suburban telephone service. This short wave connection is a valuable asset inasmuch as the mine is five miles from the nearest wired telephone. The Birmingham office of McCullough Industries can get in touch with Mr. Stewart whenever he is in or near his car and, at the same time, he can phone that office or any other party on the Bell system.

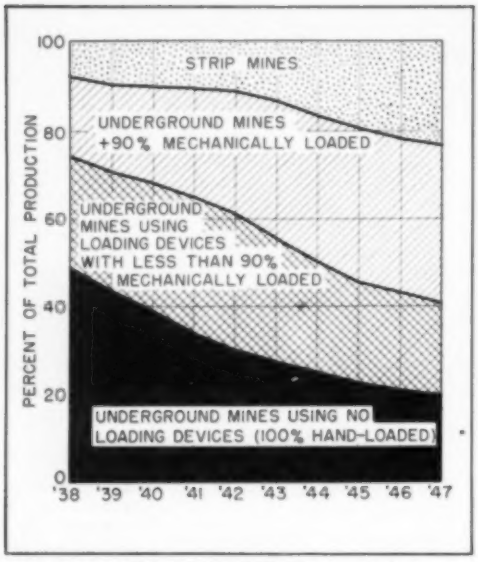


FIG. 1—TOTAL BITUMINOUS TONNAGE, by methods of mining, 1938-47, showing rapid growth of stripping and mechanical loading.

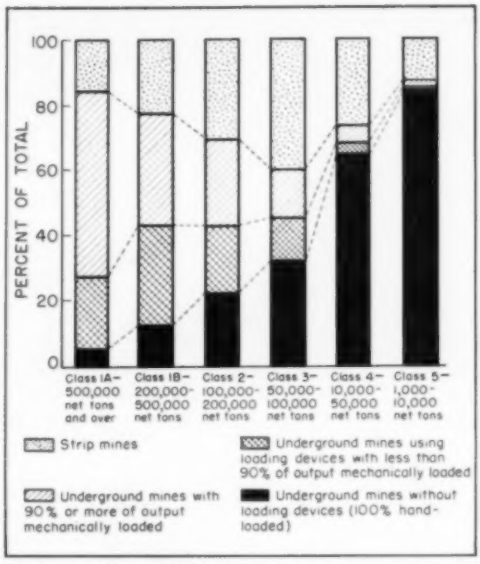

PERCENT OF TOTAL
100
80
60
40
20
0
Class 1A— 500,000 net tons and over
Class 1B— 200,000- 500,000 net tons
Class 2— 100,000- 200,000 net tons
Class 3— 50,000- 100,000 net tons
Class 4— 10,000- 50,000 net tons
Class 5— 1,000- 10,000 net tons
Strip mines
Underground mines using loading devices with less than 90% of output mechanically loaded
Underground mines with 90% or more of output mechanically loaded
Underground mines without loading devices (100% hand-loaded)

FIG. 2—1947 BITUMINOUS OUTPUT, by size of mines and mining methods. Some 5,200 hand-loaded mines mined only 51,000,000 tons.

Mine Size and Mechanization

Strip and Mechanically Loaded Bituminous Tonnage Increases Sharply in 10 Years as Hand-Loaded Output Declines—170 Large Mechanical Mines Produce 23.8% of 1947 Total—Hand-Loading Operations Usually Small

By W. H. YOUNG, Chief, Bituminous Coal Section
And R. L. ANDERSON, Engineer-Economist
U. S. Bureau of Mines, Washington, D. C.

THE RAPID GROWTH of mechanization in bituminous mines in recent years prompts this special study on the relationship of the size of mines to mechanization. Within the past 10 years the percentage of total production mined by stripping and mechanical loading underground has been increas-

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Table I—Number of U. S. Bituminous Mines in 1947, by Mining Methods and Mine Size

Size of Mines (Net Tons)	Strip Mines		Underground Mines — Output Mechanically Loaded — 90% or More		Underground Mines — Output Mechanically Loaded — Less Than 90%		Underground Mines — 100% Output Hand-Loaded		Underground Mines — Total		Grand Total, All Mines
	Prod.	%	Prod.	%	Prod.	%	Prod.	%	Prod.	%	Prod.
Class 1A, 500,000 and over	39	27.8	150	63.2	59	44.4	14	11.4	223	45.4	262
Class 1B, 200,000 to 500,000	35	25.0	53	22.5	47	35.2	20	16.6	120	24.5	155
Class 2, 100,000 to 200,000	27	19.6	23	9.7	19	14.1	19	15.7	61	12.4	88
Class 3, 50,000 to 100,000	20	14.5	7	3.1	7	4.9	16	13.4	30	6.1	50
Class 4, 10,000 to 50,000	16	11.5	4	1.4	2	1.4	38	31.9	44	8.9	60
Class 5, 1,000 to 10,000	2	1.6	...[1]	0.1	...[1]	...[2]	13	11.0	13	2.7	15
Total All Classes	139	100.0	237	100.0	134	100.0	120	100.0	491	100.0	630

ing rapidly, while the percentage loaded by hand has been declining (Table II and Fig. 1). To show more readily the significance of the size of mines, they have been classified for this study into four methods of mining: (1) strip mines, (2) underground mines with 90% or more of the output mechanically loaded, (3) underground mines using loading devices but with less than 90% of the output loaded mechanically and (4) underground mines without loading devices (100% hand-loaded). These four groups include all bituminous and lignite mines producing 1,000 tons or more annually.

A large percentage of the total output in 1947 was produced by 170 large mines using mechanical-loading devices, and a rather small percentage was produced by many small mines using 100% hand-loading (Tables I and II and Fig. 2).

The total production of all mines in the largest size group, Class 1A, with an annual output of over 500,000 tons, is represented in the first bar diagram of Fig. 2, with the percentage of this total production mined by each of the four methods of mining indicated. It is to be noted that 57% of the total production of all mines in this size group came from underground mines with 90% or more of their output mechanically loaded. Strip mines accounted for 15% of the total, while underground hand-loading mines turned out only 5%

Table II—U. S. Bituminous Production and Number of Mines by Methods of Mining, 1938-47

Year	Strip Mines	Underground Mines: Using mechanical-loading devices: 90% or More of Output Mechanically Loaded	Underground Mines: Using mechanical-loading devices: Less Than 90% of Output Mechanically Loaded	Underground Mines: Using mechanical-loading devices: Total	Underground Mines: 100% of Output Hand-Loaded	Underground Mines: Total	Grand Total, All Mines
			Production—Millions of Net Tons				
1938	30	59	88	147	171	318	348
1939	38	79	107	186	171	357	395
1940	43	107	135	242	176	418	461
1941	55	128	152	280	179	459	514
1942	67	165	173	338	178	516	583
1943	80	184	163	347	163	510	590
1944	101	208	158	366	153	519	620
1945	110	206	136	342	126	468	578
1946	113	193	121	314	107	421	534
1947	139	237	134	371	120	491	630
			Percent of Total Production				
1938	8.7	17.0	25.3	42.3	49.0	91.3	100.0
1939	9.6	20.0	27.2	47.2	43.2	90.4	100.0
1940	9.4	23.2	29.2	52.4	38.2	90.6	100.0
1941	10.7	24.9	29.6	54.5	34.8	89.3	100.0
1942	11.5	28.4	29.6	58.0	30.5	88.5	100.0
1943	13.5	31.1	27.7	58.8	27.7	86.5	100.0
1944	16.3	33.6	25.4	59.0	24.7	83.7	100.0
1945	19.0	35.7	23.5	59.2	21.8	81.0	100.0
1946	21.2	36.2	22.6	58.8	20.0	78.8	100.0
1947	22.1	37.7	21.2	58.9	19.0	77.9	100.0
			Number of Mines				
1938	465	272	373	645	4,667	5,312	5,777
1939	537	345	356	701	4,582	5,283	5,820
1940	638	400	411	811	4,875	5,686	6,324
1941	769	437	460	897	5,156	6,053	6,822
1942	834	475	501	976	5,162	6,138	6,972
1943	1,004	519	469	988	4,628	5,616	6,620
1944	1,240	575	482	1,057	4,631	5,688	6,928
1945	1,370	626	490	1,116	4,547	5,663	7,033
1946	1,445	634	528	1,162	4,726	5,888	7,333
1947	1,750	758	505	1,263	5,687	6,950	8,700

Table III—1947 Bituminous Production in Millions of Net Tons, by Mining Methods and Mine Size

Size of Mines (Net Tons)	Strip Mines No.	Strip Mines %	Underground Mines: Output Mechanically Loaded: 90% or More No.	90% or More %	Less Than 90% No.	Less Than 90% %	100% Output Hand-Loaded No.	100% Output Hand-Loaded %	Underground Mines: Total No.	Underground Mines: Total %	Grand Total, All Mines No.
Class 1A, 500,000 and over	45	2.6	170	22.4	70	13.9	18	0.3	258	3.7	303
Class 1B, 200,000 to 500,000	116	6.6	172	22.7	147	29.1	63	1.1	382	5.5	498
Class 2, 100,000 to 200,000	197	11.2	160	21.1	128	25.3	133	2.3	421	6.1	618
Class 3, 50,000 to 100,000	287	16.4	98	12.9	89	17.6	230	4.0	417	6.0	704
Class 4, 10,000 to 50,000	633	36.2	115	15.2	66	13.1	1,851	32.6	2,032	29.2	2,665
Class 5, 1,000 to 10,000	472	27.0	43	5.7	5	1.0	3,392	59.7	3,440	49.5	3,912
Total All Classes	1,750	100.0	758	100.0	505	100.0	5,687	100.0	6,950	100.0	8,700
			Percentage of Production, Classified by Size of Mines and Methods of Mining								
Class 1A, 500,000 and over		14.8		57.3		22.7		5.2		85.2	100.0
Class 1B, 200,000 to 500,000		22.4		34.4		30.4		12.8		77.6	100.0
Class 2, 100,000 to 200,000		31.1		26.2		21.4		21.3		68.9	100.0
Class 3, 50,000 to 100,000		40.2		14.6		13.1		32.1		59.8	100.0
Class 4, 10,000 to 50,000		27.0		5.7		3.1		64.2		73.0	100.0
Class 5, 1,000 to 10,000		14.1		1.6		0.2		84.1		85.9	100.0
Total All Classes		22.1		37.7		21.2		19.0		77.9	100.0

[1]Less than 1 million. [2]Less than 0.1%

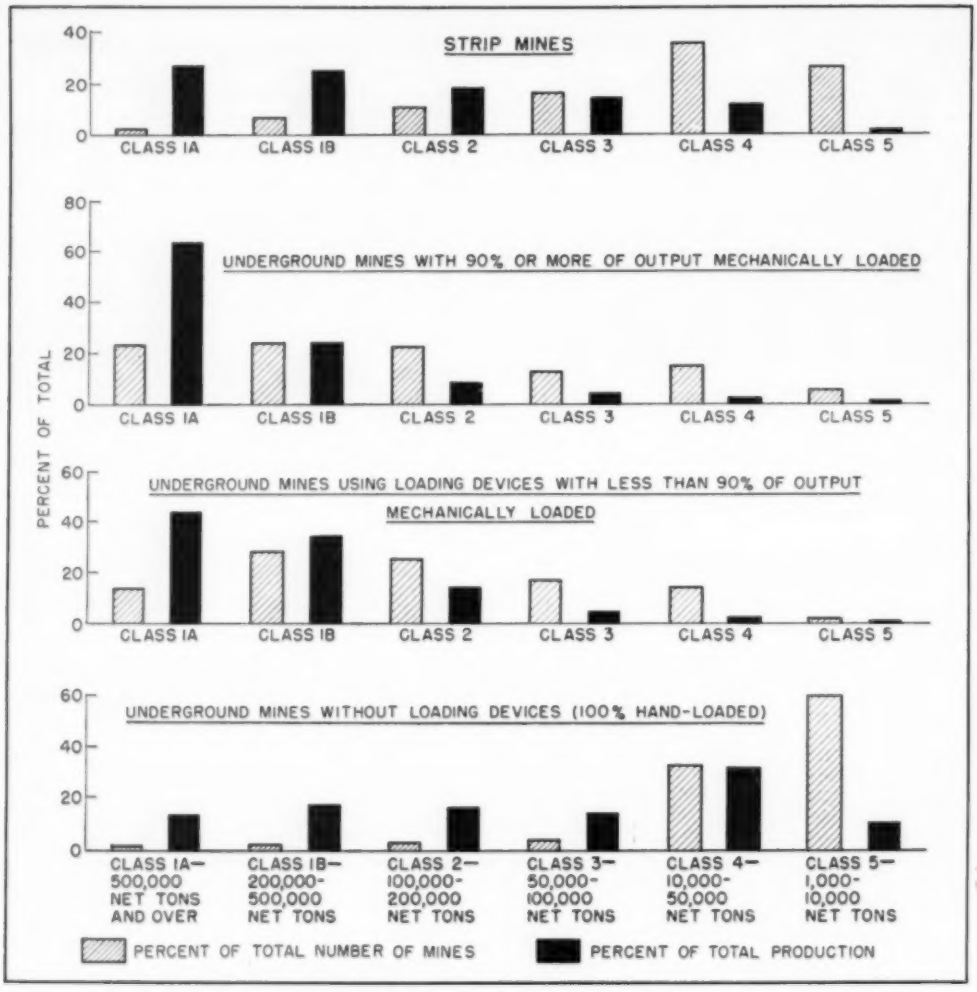

STRIP MINES
UNDERGROUND MINES WITH 90% OR MORE OF OUTPUT MECHANICALLY LOADED
UNDERGROUND MINES USING LOADING DEVICES WITH LESS THAN 90% OF OUTPUT MECHANICALLY LOADED
UNDERGROUND MINES WITHOUT LOADING DEVICES (100% HAND-LOADED)
PERCENT OF TOTAL
CLASS IA
CLASS IB
CLASS 2
CLASS 3
CLASS 4
CLASS 5
CLASS IA— 500,000 NET TONS AND OVER
CLASS IB— 200,000- 500,000 NET TONS
CLASS 2— 100,000- 200,000 NET TONS
CLASS 3— 50,000- 100,000 NET TONS
CLASS 4— 10,000- 50,000 NET TONS
CLASS 5— 1,000- 10,000 NET TONS
PERCENT OF TOTAL NUMBER OF MINES
PERCENT OF TOTAL PRODUCTION

FIG. 3—NUMBER AND PRODUCTION of bituminous-coal mines in 1947, by methods of mining and size of mines.

of the total production in this size group.

In medium-size mines, Classes 2 and 3 (50,000 to 200,000 tons), the predominant proportion of the production originated from strip mines—31 to 40%. Hand-loading mines accounted for 21 to 32% of total production in these two groups, while 15 to 26% was from underground mines with 90% or more of the output mechanically loaded.

Underground mines with all output loaded by hand accounted for 84% of total production in the smallest size group, Class 5 (1,000 to 10,000 tons). Strip mines produced 14%, while less than 2% of the production came from mines using loading machines.

The total number of mines and total production were classified by methods of mining and size of mines and percentages were calculated for each group (Tables I and III and Fig. 3).

Strip Mines—Over 63% of the total number of strip mines were small—producing less than 50,000 tons—and these small operations mined only 13% of the total strip coal. On the other hand, 3% of the strip mines, those with an annual output of over 500,000 tons, produced 28% of all strip coal.

Mines With Mechanical Loading—Over 22% of the number of underground mines with 90% or more of output mechanically loaded had an annual output of over 500,000 tons. These mines accounted for 63% of total production for the group.

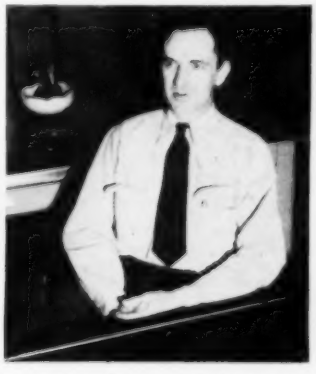
Hand-Loading Mines — By far the greater proportion of total number of hand-loading mines—60%—were small and produced 1,000 to 10,000 tons. Nevertheless, there were 18 mines producing over 500,000 tons each in 1947 that loaded all of their coal by hand. These 18 mines produced 14,000,000 tons, or over 11% of total production from hand-loading mines.

Fred Morrison (seated, left) and Harley Bryant, section foremen; R. D. Swann, supply clerk; Floyd Owen, section foreman; L. E. Geary (standing, left), section foreman; Barney Shadrick, master mechanic; Everett Roberts, general superintendent; Bill Moneyheffer, dispatcher; Horace Moore, electrician; and Alfred Tate, section foreman; Palmer mine, Tennessee Consolidated Coal Co., Palmer, Tenn.

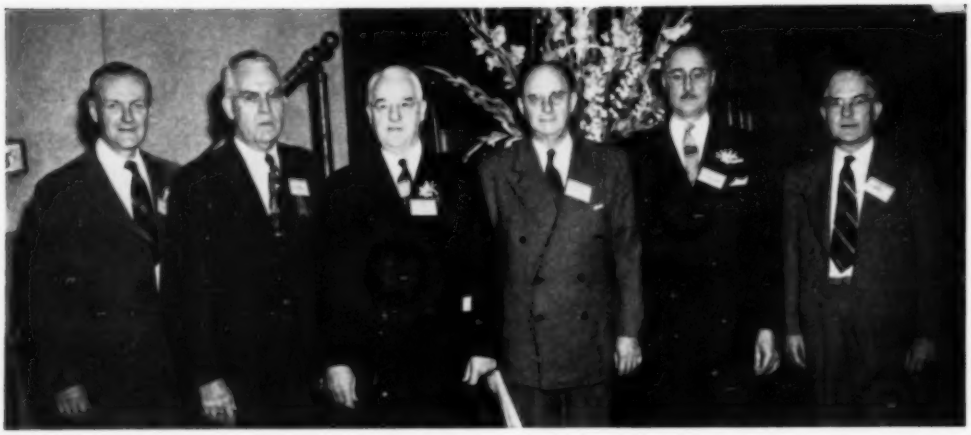
COAL MEN ON THE JOB

Left photo—H. W. Kilgore (left), executive assistant, and L. G. Bishop, general superintendent, underground mines; right photo—John Brennan (left), assistant shop foreman, and J. R. Baxter, chief electrical engineer; DeBardeleben Coal Corp., Sipsey, Ala.

W. G. Gerow (left), engineer, J. M. Bishop, chemist, Dale Massie, outside boss, and J. M. McCoy, engineer, Ceredo, W. Va., preparation plant, Truax-Traer Coal Co.



L. D. Sides, chief engineer, DeBardeleben Coal Corp., Sipsey, Ala.



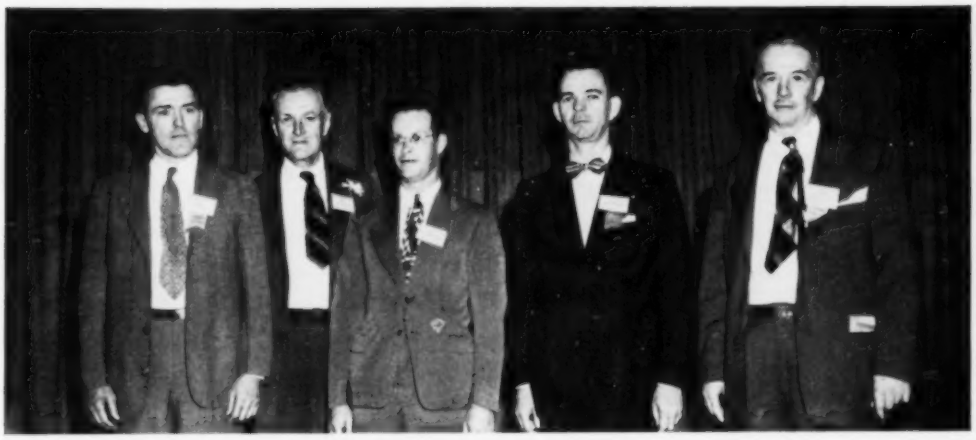
MANAGEMENT PROBLEMS—M. D. Cooper (left), National Coal Association, floor committeeman; L. C. Campbell, Eastern Gas & Fuel Associates, chairman; C. W. Connor, Armco Steel Corp.; J. R. Foster, Chicago, Wilmington & Franklin Coal Co.; H. C. Woods, Sahara Coal Co.; and C. E. Lawall, Chesapeake & Ohio Ry. R. L. Ireland Jr., Hanna Coal Co., and L. Ebersole Gaines, The New River Co., also talked briefly on management-employee relations.

Coal Show Sets New Records

New Machines and New Ideas at Mining Congress Coal Show Measure Industry's Advance and Point to Bright Future—Equipment Display Sets Record—Papers Range Over Entire Field of Production and Management—Nearly 14,000 Attend Four-Day Convention in Cleveland

OVER 13,500 COAL MEN, equipment manufacturers and others met in Cleveland, Ohio, May 9-12, for the 1949 American Mining Congress Coal Show. They set a new high mark for attendance, saw a display of machinery and equipment that was 40% greater than ever before and, in 10 sessions, some of which ran concurrently, heard addresses on coal utilization and marketing, face operations, surface preparation, strip and steep-pitch mining, underground haul-

UNDERGROUND HAULAGE—Paul Weir (left), Paul Weir Co.; W. C. Smith, Stonega Coke & Coal Co.; Frank Eubanks, Old Ben Coal Corp.; Carel Robinson, Robinson & Robinson; and C. R. Nailler, Pursglove Coal Mining Co., session chairman. Harold B. Wickey, Consolidation Coal Co. (W. Va.), and D. E. Renshaw, Westinghouse Electric Corp., discussed the papers read by these speakers.



MAINTENANCE AND VENTILATION—S. M. Cassidy (left), Consolidation Coal Co. (Ky.), chairman, Coal Division, A.M.C.; M. D. Cooper, National Coal Association, floor committeeman; W. F. Diamond, Marianna Smokeless Coal Co.; David Ingle Jr., Ingle Coal Co., session chairman; and Glenn Southward, mechanization engineer, A.M.C. H. D. Bowker, West Virginia Coal & Coke Corp.; R. G. Heers, Kaiser Co., Inc.; and R. J. Bowen, Geneva Steel Co., were leading figures at this session but were absent when picture was taken.

age, trackless mining, maintenance and ventilation, safety and labor relations.

Machines and equipment to speed mining, cut costs and safeguard workers, described elsewhere in this issue, shared the spotlight with papers and discussions on mining methods and the problems of the industry. The prevailing feeling among coal producers and equipment manufacturers alike was one of pride in past progress and confidence in the years ahead.

Transportation Progress

A NEW STUDY soon will get under way on care of belts, according to A. E. Long, superintendent, Clearfield Bituminous Coal Corp., Indiana, Pa., who, as chairman, Mining Congress committee on belt conveyors, led off a discussion of belt-conveyor loading at the trackless-mining session. A. R. Matthews, president, Clinchfield Coal Corp., Dante, Va., presided and presented L. Ebersole Gaines, president, The New River Co., Mt. Hope, W. Va., chairman of the convention program committee.

Briefly summing up previous reports of the belt-conveyor committee on costs and on gathering haulage, Mr. Long stated that his committee always had attempted to reach fair and impartial conclusions, so that operators would have a yardstick for measuring the performance of their equipment.

The recommendations of belt and conveyor manufacturers on good loading practice were reviewed by Robert Fletcher, engineer, J. H. Fletcher Co., Huntington, W. Va. Replies received in answer to Mr. Fletcher's questions stressed the following points:

1. Overloading should be avoided because spillage near the loading hopper often damages the belt. An auxiliary feeder between the shuttle car and the belt or controlled shuttle-car feed will even the flow of material.

2. Speed should be regulated to avoid spillage at the loading point. Auxiliary feeders should discharge the coal to the belt conveyor in line with the conveyor and as rapidly as possible.

3. Impact should be cushioned by regulating height of discharge, screening fines onto the belt through a bar screen so that lumps fall onto a bed of fines, providing a shock-absorbing type of idler or using a cushioning belt beneath the main belt.

4. Material should be aligned through hopper or skirt boards. The distance between skirt boards should be about 75% of belt width and slightly greater toward the outby end. Flashing should be used to eliminate rubber contact with the belt.

5. Common sense is a strong factor in successful belt-conveyor loading. Adequate lighting, frequent cleanup and occasional adjustment are necessary for best results.

Since the unloading rate of a shuttle car is much greater than usual belt capacity, either the shuttle discharge must be slowed down or the belt speed must be increased at the time of unloading, unless some means can be found to provide a surge hopper or conveyor between the shuttle car and the belt, declared V. D. Hanson, mechanical engineer, Pittsburgh Coal Co., Library, Pa. This can be provided by a home-made open-end steel hopper which straddles the belt and is about 7 ft long, 4 ft wide at the top with the sides sloping down to a bottom opening 14 in wide by 7 ft long. Through this opening, the coal drops onto the belt, which acts as a self-feeder to empty the hopper. Through a system of hinged levers and connecting rods, the plates move forward and down to form the hopper when coal is being loaded at the station. When not in use, the plates swing up and away from the belt. The opening and closing is automatically operated by the shuttle car, which pushes against a bumper rod and swings the plates into loading position. The opposite sides follow this same motion through connecting rods. The weight of the coal holds the plates in closed position until the hopper is empty. When the shuttle car pulls away, the counterweight swings the plates back into open position.

Other solutions to this problem, Mr. Hanson pointed out, are: (1) a shaker feeder conveyor discharging over the tail section of a belt; (2) a belt feeder or chain feeder to speed the transfer of coal from shuttle car to belt conveyor and to even out the flow from surge bin to belt; and (3) an extensible shaker feed, consisting of a shaker conveyor drive, troughing and a large, flat hopper into which the shuttle car dumps its load. One advantage of the shaker type is that it may be extended as much as 150 ft with small-capacity shuttle cars, thus keeping the shuttle-car haul at minimum distance. However, the final

STEEP PITCH MINING—O. B. Pryor, Valley Camp Coal Corp., floor committee; S. J. Craighead, U. S. Fuel Corp., session chairman; D. E. Ingersoll, P. & R. Coal & Iron Co.; I. W. Miller, Black Diamond Coal Mining Co.; and T. H. Wilson, Crow's Nest Pass Coal Co.

choice of a system must depend on the number of units discharging onto the belt, the rate of discharge, capital investment required and the capacity of the belt, he concluded.

Describing briefly the use of shaker feeders to transfer coal from shuttle cars to a belt conveyor, A. B. Crichton Jr., assistant to the president, Johnstown Coal & Coke Co., Johnstown, Pa., cited the following advantages in the smooth flow of coal resulting from the use of shaker feeders: (1) in low coal, where belt conveyors and shuttle cars are used, roof holes are not required for clearance between shuttle cars and the roof when cars are elevated on a ramp; (2) shooting bottom holes to lower the tail pulley is not necessary, thus eliminating water accumulation and easing retreat work; (3) no men are required at transfer points nor are there any "slug" loads; (4) continual stopping and starting of belts is eliminated; (5) scuffing of the belt is avoided because coal is fed in in the direction of belt travel; (6) a continuous light flow of coal makes water spraying more efficient; (7) spillage is reduced; and (8) some coal is flowing constantly to the tipple, thus assuring a product of even quality. Reporting the cost of a shaker feeder to be about $4,500, Mr. Crichton declared that the investment in this unit is quickly returned through the advantages listed.

Direct transfer of coal from shuttle car to conveyor belt results in abrasion, cutting and gouging of the belt and in a high rate of spillage, said C. W. Thompson, assistant manager, Weirton Coal Co., Isabella, Pa. Eliminating these problems would result in large savings in belt costs as well as labor costs, he said. The latest development along this line lies in the use of shuttle cars dumping into high-capacity chain conveyors with accelerated short surge conveyors acting between chain and belt conveyor. Briefly, the system is as follows: a twin-driven heavy-duty chain conveyor receives coal from shuttle cars through a number of hopper stations along the conveyor line. Coal is piled high at these stations but is held back by plows attached to the side of the hopper. These plows keep coal from spilling off the chain conveyor where hopper plates are not attached. The big chain conveyor can be extended to 350 ft, handling coal at the rate of 5 tons per minute and receiving coal from shuttle cars at the rate of 10 tons per minute, this being made possible by the use of several stations.

The heavy-duty conveyor dumps onto a short flat chain conveyor which absorbs the shock and lowers the coal to within 4 in of the top of the belt conveyor, Mr. Thompson continued. This reduces cascading and eliminates carcass rupture. Accelerating the coal speed to the belt speed horizontally rather than vertically avoids the need for pneumatic idlers and eliminates abrasion entirely, he concluded.

Moving Supplies in Thin Seams

The difficulties of getting materials and men to the face are increased by trackless mining and thin seams, said G. O. Tarleton, vice president, Consolidation Coal Co. (Ky.), Jenkins, Ky., who addressed the convention on tractors and trailers for supply haulage. Laying track parallel to the belt is costly and, besides, track will stop at the section-supply station nearest the face, thus leaving some distance still to be traveled and necessitating rehandling of the material. Likewise, use of the belt to move supplies and men is unsatisfactory because of the dangers involved, the necessity of shutting down while the belt is reversed, damage to the belt itself and the necessity of rehandling the material at the unloading end.

To solve these problems, Mr. Tarleton reported, tractors and trailers are proving useful. In a changeover from rail to rubber-tired haulage, a Baker timbering machine was supplemented by a rubber-tired trailer designed and manufactured by J. H. Fletcher & Co. The trailer bed is supported by two pneumatic wheels, which can be steered by the timber helper or automatically, the trailer in the latter case following behind the timbering machine and thus rounding turns without cutting corners. In fact, a train of trailers can be pulled into the mine and dropped off one by one at the successive sections, where timber crews can pick them up and steer them manually to the face.

Present trailers are 6 ft 6 in wide and 14 ft 4 in long, with a maximum height of 30 in and a 7-in road clearance. Even with the present system, however, there still is room for improvement, Mr. Tarleton pointed out. It may be possible, for example, to load a series of trailers outside aboard a carrier truck and then to pull the loaded trailer off on the section. Or it may be practicable to palletize a unit timber package outside, place it on the supply car and then, when inside, unload the package onto a trailer by means of a hoist. Tractor-trailer methods have proved to be especially useful in contour mining, Mr. Tarleton stated.

A Baker mine tractor provides motive power for the trailers from a 450-amp 48-volt storage battery, Mr. Tarleton explained. Good roadbed maintenance is justified by savings in power demand on storage batteries, larger pay loads and decreased tractor maintenance. A rigid schedule for battery maintenance should be set up, he urged. A recent development described by Mr. Tarleton involves the use of trailers for the man-trip as well.

In still thinner seams, averaging 32 in, a Trike, originally designed as a supervisor's inspection car (Coal

LABOR RELATIONS—D. C. Jones (left), Pennsylvania State College; S. M. Cassidy, Consolidation Coal Co. (Ky.); and L. Ebersole Gaines, The New River Co.

Age, May, 1948), now is used to pull a specially designed trailer through mud and over rough ground and in low and closely timbered places, Mr. Tarleton reported. Headers, pans, cradles, belt-extension parts and other section supplies are carried in, thus eliminating all supplying by belt. Its low height enables the Trike to pass under pan lines at the drives and to cross over pan lines closer to the face by means of a small ramp and filler block. In 14 shifts, said Mr. Tarleton, the Trike averaged 3,000 lb hauled 1,500 ft per shift, 6.3 trips per shift and close to 500 lb pay load per trip. With new trailers now being manufactured for use with the Trike, pay loads of 1,000 lb look reasonable. Special trailers now are being designed for man trips, powder-haulage, greasing, fire-fighting, spraying and dust control, Mr. Tarleton concluded.

Among the advantages of Femco trolleyphones in No. 11 mine, Old Ben Coal Corp., Christopher, Ill., listed by Frank Eubanks, superintendent of maintenance underground, were the following: three trappers moved to more productive jobs, movement of the same tonnage of coal with the same number of locomotives although haulage distance increased 1½ miles, elimination of a loop track permitting sealing that part of the mine, immediate reporting of trouble by motormen, operation of four locomotives over a single section of track that formerly accommodated only two and quick rerouting of empty trips if one section is having an exceptionally good run and another is lagging. Mr. Eubanks spoke at the underground haulage session Wednesday afternoon, with C. R. Nailler, Pursglove Coal Mining Corp., presiding.

Trolleyphone experience, Mr. Eubanks reported, has resulted in the conclusion that for improved over-all efficiency and greater safety, planning of future haulage must be based on making use of the most complete communication system available. He prefaced his paper by discussing the many difficulties encountered in haulage without adequate communication.

Russell Morris, maintenance superintendent, Consolidation Coal Co. (W. Va.), read a discussion of trolleyphone operation prepared by Harold B. Wickey, general superintendent, northern division of that company. Underground telephone lines are used to transmit the carrier current to reduce noise when communicating long distances. An inductive coupling arrangement transmits the carrier frequency to and from the trolley wire. Although three or four miles was mentioned as the workable range for trolleyphone installations, it was recommended that preliminary studies be made of the power distribution network to permit locating the dispatcher so that communication distances will be as short as possible. Several instances were cited in which the trolleyphones averted difficulties and accidents. Now, Mr. Wickey wants a "Dick Tracy type wrist-watch radio" to enable the brakeman to keep in constant touch with the motorman.

Among the new tricks in underground belt haulage briefed by Carel Robinson, Robinson & Robinson, Charleston, W. Va., were the following: fast idler sections on slope belts carrying men; two permanently connected motors for 550- and 200-fpm operation of slope belts serving a dual purpose—a result of slow delivery of a standard two-speed motor and high cost of a clutching arrangement; variable spacing of idlers on a slope belt where tension is high at the head of the slope and low on the flat at the bottom; use of short cushion belts as speed-up feeders to long belts, thus concentrating acceleration wear on the low-cost short belt and greatly minimizing wear on the long belt; an S-arrangement for unloading rock at an intermediate point from a continuous belt to a short-cut leading to a refuse dump without plowing the rock off the belt; and placing angle-iron rails alongside the belt to keep large lumps from bouncing off.

Mr. Robinson said the greatest advance in belt practice since the early '40s has been the increase in belt speeds from 200 fpm, usual at that time, to 400 to 600 fpm common now. He discussed many of the primary considerations that must be taken into account when designing a belt installation. The high cost of belts made with nylon and steel cords may rule out a long-center belt in favor of shorter belts of standard construction.

Use of depression-type load switches under main and section belts at points 10 ft or so from the transfer points to prevent overloading of the main belt and to turn dust-allaying sprays on and off automatically at a 5,000-ton mine was described. In one installation with a main belt having a capacity of 1,200 tph, two 600-ton section belts are permitted to discharge continuously to the main belt but a third section belt will not start unless the main belt is carrying only about half its capacity. A centrifugal switch in the tail pulley of a belt was designated as a preferable arrangement for sequence starting and for protection against operating an inby belt when the outby one is stopped. A piano wire strung about the belt and connected to an electric switch serves well for emergency control and protection against roof falls.

Surge Bin Evens Coal Flow

Mr. Robinson also discussed storage and surge-bin facilities as tied into belt-conveyor design. To avoid dumping the whole mine output through the storage bin at one mine, a feeder at the discharge carries 8 tons of the product per minute directly to the washing plant while the surplus or overflow goes into the storage bin. A feeder starts automatically and supplies any deficiency to the washing plant. In one system for pile-surge storage, the discharge end of the belt automatically rises by 6-in steps to a maximum of 40 ft if the top of the pile reaches that elevation. Lowering of the belt takes place automatically as the feeder beneath diminishes the pile.

Belt equipment to lower a 300-tph output 1,161 ft over four belt sections totaling 3,940 ft at the new Glenbrook mine was described by W. Clifford Smith, chief engineer, Stonega Coal & Coke Co., Big Stone Gap, Va. Belts are 42 in wide and the sections zig-zag down the mountainside on a pitch of 15 deg 50 min. The speed is governed by a 75-hp induction-motor driver which limits the increase from the no-load figure of 227 fpm to 242 fpm full load. For stopping duty and emergency protection, 60-in brake wheels mounted on the head shafts are fitted with post-type brakes operated by 600-lb Thrustors to provide

a 25,000-lb-ft braking torque, stopping a fully loaded belt within 18 ft.

For what he called the twilight zone between shallow depths where belt slopes are recognized as best and the great depths where skips and shafts are supreme, Paul Weir, president, Paul Weir Co., Chicago, recounted in some detail the numerous considerations that require engineering and economic study before a wise decision can be made between driving a belt slope and sinking a shaft. The auxiliary facilities for supplying ventilation, handling men, disposing of rock and transporting equipment and supplies can have an important bearing.

Recent developments cited by Mr. Weir as influencing the selection of slope belts and skips are mechanical mucking and the McKinlay entry driver for slopes under 18 deg; mechanical mucking for shafts; availability of stronger belts for greater depths, greater loads or both; and the wide use of underground belts, which has familiarized many operators with this type of transportation equipment. As to power requirements, the over-all efficiency in driving a slope belt is likely to be about 75% compared to 35 to 50% for a skip hoist.

Except where the coal is very shallow or very deep, there are no ready-made answers to the problem of the slope belt vs. the hoist, agreed D. E. Renshaw, Westinghouse Electric Corp. Labor is being saved in skip-hoisting jobs by making them fully or semi-automatic. At Snow Hill, in Indiana, a 1,250-hp dc skip installation hoisting from two levels has been made completely automatic, using timing relays to regulate the stop time for loading and dumping the skips. At a Pennsylvania mine with an ac hoist, a small dc generator has been geared to the drum for dynamic braking. The only operator is one man at the bottom, who pushes a button to start the hoist each time after he has operated the rotary dump.

Deep-Mining Highlights

AT THE SESSION MONDAY MORNING, Gerald Von Stroh, director, reporting on the purposes and progress of the Mining Development Committee, National Coal Association, defined continuous mining as a method "to approach a solid encompassed on five sides, reduce a portion of the solid to separate pieces or a different form and transport the product of reduction to the surface without interruption." Along with these main lines of development, service functions must be improved as follows: a roof control system geared to the speed of the operation, with rockdusting also set to the same pace; a high rate of ventilation to carry off gases released at a higher rate of speed; more reliable ways to control dust; improvement in illumination; acceleration of supply-handling; and increase of power.

Reviewing past efforts, dating back to 1870, to build a continuous mining machine, Mr. Von Stroh contended that continuous mining is a complex system, not a machine. However, much can be learned from earlier attempts that may point the way to specifications set up by the Mining Development Committee. These specifications call for a machine that, among other things, will mine seams as thin as 28 in, produce 2 tons per minute up or down a 12% grade, turn out a minimum of 50 tons per man per shift, have a tramming speed of 250 fpm and produce not more than 50% of sizes under ¾ in and not more than 40% of minus ⅛-in fines.

Thus far, the "basic design philosophy" to meet these specifications has been evolved, Mr. Von Stroh reported, and a full-scale experimental model to test the theory is being built. Meanwhile, investigations along other lines are proceeding, including studies of stainless-steel conveyor belts, plastic closures for hydraulic systems and coil-spring troughing rollers.

Results of considerable operation of and experimentation with the Joy continuous miner were reported by G. S. Jenkins, vice president, Consolidated Coal Co., St. Louis, Mo., who described operations in an 8½-ft seam leaving 1½ ft of bottom coal and 1 ft of top coal. The method used involved a shuttle car acting as a surge bin and discharging into another shuttle car, the latter transporting the coal to a transfer station. Problems encountered included the following:

1—Dust. Sprays have been used with up to 200-lb pressure, providing up to 8 gal of water per ton of coal. In future experiments, pressure will be pushed upward toward 1,000 lb.

2—Power demand. Peak power demand comes when the machine is sumping in and drops off during the shearing action. Distribution of power in the mine will have to be changed radically.

3—Bit consumption. Production averaged 30 tons per bit. More bits were broken than were worn out.

4—Size consist. Not greatly different from that obtained by conventional mining methods.

5—Safety. Not so much a problem as with conventional methods.

6—Maintenance. There still is much to be learned about maintenance of the continuous miner.

Citing the need for cost-cutting in view of higher wages for miners and coal's loss of competitive strength to fuel oil, J. J. Snure, production manager, Rochester & Pittsburgh Coal Co., Indiana, Pa., stressed the need for a machine of simple design, a minimum of cycle phases, low manpower requirements and high productivity. "The continuous miners should be, when developed, one of the answers to this problem," he declared. The machine has been used in Rochester & Pittsburgh properties for entry driving and room mining. Entries are driven in sets of three. In production, the coal is worked on the room-and-pillar system, with rooms on 25-ft centers, 325 ft deep and with a cut-through from air course to belt entry every 50 ft. In entry work, 14-ft entries are driven, the first entry being driven 100 ft. Then the machine is pulled back and moved into the second entry for 100 ft, with crosscuts at 50 and 100 ft. Returning to the first entry, the process is repeated until both entries are driven 300 ft deep. The third entry then is driven the entire 300 ft, with crosscuts every 50 ft into No. 2 entry, Mr. Snure explained.

In room work, coal from two rooms is hauled to the belt through the cut-through by shuttle car. If transportation can be developed to carry the increased haulage distance, it may be feasible to drive rooms 400 ft, Mr. Snure suggested. Two machines can be operated in production work by working on each side of the belt heading and directing the ventilating current up both sides and out through bleeders at the top, he said.

Continuous-Miner Problems

Commenting on various aspects of work with the continuous miner, Mr. Snure pointed out that transportation is the major hurdle and that some temporary methods have been devised to get better efficiency pending development of an entirely new method; that the machine is well engineered and should need few basic changes beyond strengthening the cutting equipment, improving the water sprays and improving the accessibility of parts for better maintenance; that a large quantity of air at high velocity is needed; that dust is a real problem but can be solved by better spraying; that roof hazards are fewer than when using conventional mining equipment; that manpower requirements, already somewhat reduced, can be cut further by operating two or three machines on one belt; that production can reasonably be expected to average 200 tons per shift with six men to a crew; and that safety is much improved. "Within 7 to 10 years, almost all coal will be mined by a machine which cuts and loads without the necessity of drilling and shooting," Mr. Snure predicted.

The Colmol drives a 9½-ft face without cutting, drilling or shooting and does it in a continuous operation at the rate of 100 tons per man per day, reported C. H. Snyder, president, Sunnyhill Coal Co., Pittsburgh, Pa. The rate of advance is 18 to 24 in per minute. The mine floor is cleaned up

and less than 1% of the coal is left in room corners, he said. The Colmol operates with a series of rotary chipping heads which chip the coal in overlapping annular concentric kerfs, thus causing the coal to be freed from the solid and break out ahead of the teeth. This prevents excessive bug-dust and results in a low percentage of fines. The cutting head operates on less than 100 hp and the entire machine, which is self-propelled, uses less than 120 hp. Having been tested in various seams, the machine, Mr. Snyder stated, "should operate successfully in the entire range of bituminous coals." A total of four men can operate and service the machine at the face.

Safety features of the Colmol, according to Mr. Snyder, are the following: sound roof; strong, uniform ribs; almost complete cleanup; and location of the operator's station some 20 ft from the face. Describing modifications soon to be made in the machine, Mr. Snyder listed the following: reduction in over-all length from 24 ft 9 in to 20 ft 9 in; width, from 7 ft 1 in to 6 ft 5 in; increase in width of cut from 9 ft 5 in to 9 ft 7 in. Models will be produced for seams ranging from 30 in up to 7 or 8 ft in thickness.

Maintenance Guides Listed

With David Ingle Jr., Ingle Coal Co., presiding, maintenance of equipment in two mines with a total of 20 Goodman shaker conveyors and duckbills, seven 30-in troughed conveyors, 24 shortwalls and a number of belt conveyors in use was described by W. F. Diamond, general superintendent, Marianna Smokeless Coal Co., Marianna, W. Va. Mr. Diamond was lead-off speaker at the session on maintenance and ventilation Monday afternoon. His conclusions, based on 8½ years of experience in this seam, were:

1. Daily inspections are highly important in reducing the number and severity of breakdowns.

2. Ample spare equipment and assemblies should be kept near the center of operations since moving equipment in low coal is slow and costly.

3. Regular and complete overhauls should be scheduled.

4. Quantity and application of lubricants should be closely controlled.

5. Operators should be trained to eliminate abuse and overloading of equipment.

6. Reports should be made, every day, of inspections and repairs needed and done.

7. Effectiveness of the maintenance program should be measured and accurately compiled by parts and labor-cost figures.

Flexco No. 500 hinged connectors are used on the belts and the practice, at each belt move, is to cut 2 or 3 in off the ends and re-apply the connectors to eliminate the pullouts formerly encountered. Cutting the belt at right angles to the center line is as important as proper frame alignment. Mr. Diamond favored a chalked center line established by locating 8 or 10 midpoints on the belt at 1-ft intervals beginning where the cut is to be made. He would like to see belt manufacturers put a colored strip on the top cover for squaring purposes.

Low maintenance of shaker drives depends largely on setting the drives level so that they lubricate themselves properly, mounting the drives at right angles to the trough lines, anchoring drives properly, tightening the hold-down jacks at the start of the shift and checking them during the shift. Gear assemblies, bearings, bushings, etc., for repairing drives are brought into the mine wrapped in brattice cloth to keep them clean.

A number of steps taken over several years to evolve a safe and efficient ventilating system for the Sunnyside (Utah) mine of the Kaiser Co., Inc., were described by R. G. Heers, manager. In the blowing system now used instead of the original exhausting system, changes have been made so that the air can be discharged to the surface along three routes: out the top of the cave line to a return aircourse, out the bottom end of the cave line to a bleeder or through the gob to the bleeder. As a result of the changes, bad air from old works can now be definitely kept out of the active workings, even in periods of low barometric pressure.

Use of blowers and tubing in the non-gaseous Geneva (Utah) mine of the Geneva Steel Co. was discussed by R. J. Bowen, mining engineer. The 14-ft seam pitches 12½ deg. The mine is completely mechanized with mobile loaders and shaker conveyors and operates two shifts daily. Two 84-in Jeffrey Aerodyne fans, operating exhausting, pull 350,000 cfm from the main returns.

Blowers and Tubing Provide Air

Permissible Jeffrey Midget blowers are placed 40 ft. from the near rib of the last open crosscut and 15 ft in front of the check curtain. Five blowers, comprising the usual number operating in a mobile-loader section, deliver approximately 4,000 cfm to the face regions, which, added to the quantity passing the check curtains, furnishes positive and adequate circulation.

Tubing is suspended from No. 9 annealed wire stretched near the tops of the props. Sirens on the locomotives are used to warn personnel when the machines approach check curtains. Emergency blowers are kept on hand. With continuous operation, the average period before the blower must undergo major repairs is 18 months.

Compared to brattice, blowers and tubing are lower in cost and material. Blowers and tubing take up less room and therefore interfere less with mining operations, especially in heavily timbered sections. In a rock tunnel to be driven, a 7½-hp permissible blower will exhaust smoke and fumes from shots directly to the return through 16-in non-collapsible tubing. Then, the tubing will be connected to the opposite side of the blower for forced ventilation. The 25-ft tubing sections will compress to about 4 ft for handling.

Discussing the advantages and disadvantages of brattice and blowers and tubing, R. T. Artz, U. S. Bureau of Mines, declared that tubing disadvantages included the possibility of recirculating air if not properly used, the possibility of trying to use the blowers to correct deficient main ventilation, the possibility of interrupted operation, and poor maintenance.

Advantages include abundance of fresh air in each place, reduced space requirements, greater freedom for equipment movement, elimination of the hazards involved in equipment tearing down brattices, and reduction of the hazard of men being struck by equipment going through brattices. The hazard of recirculation can be eliminated by positioning the blower 8 ft or more from the crosscut on the intake side and not permitting it to handle more than 40 percent of the incoming air.

Bit Costs Reduced

At the face operations meeting Tuesday afternoon, a bit cost as low at 0.29c per ton and a performance as high as 18 places cut in 13 min each compared to 12 at 15 min each through the use of tungsten-carbide bits was reported by Carl A. Burgener, division engineer, Peabody Coal Co., with C. B. Baton, Geo. S. Baton & Co., as session chairman. Shortwall machines were used and the average tonnage cut was raised from 444 to 666 tons. A new set of tungsten-carbide bits cut 383 places and only three had broken tips when the set was removed for the first grinding. In the next use they cut 207 places. This reduction of about half holds for the third grinding also.

In a mine operated by another Illinois producer with some of the most difficult cutting in the state and where bits tipped locally by acetylene application of tungsten-carbide rod were costing about 5c a ton, a change is being made to cemented tungsten carbide as a result of trials showing the new bit cost as 2c per ton. Chain life is improved from 20,000 to about 80,000 tons. Controller maintenance is reduced 25% and the maintenance of universal joints 40%. The machines finish their allotted work in a shorter time, thereby becoming available for other jobs, such as cutting timber hitches.

In a West Virginia mine with difficult cutting, one set of carbide bits cut 27 places before they dulled the first time and over 300 places before

finally being discarded. Steel bits formerly used in the same entry had to be changed every place. The delays for bit changing were reduced in the ratio of 27:1 and the labor cost of sharpening and handling the steel bits was eliminated.

The chief disadvantage, Mr. Burgener pointed out, is broken tips. In some mines, also, carbide bits show no advantage over conventional bits. Kicking the cutter bar into or away from the rib should be avoided, bits should be set to uniform gage and shortwall chains should never be permitted to run so loose that bits snag on the underframes.

Cutting Bottleneck Eased

A. G. Gossard, Union Colliery Co., identified his company's Kathleen mine as "the other mine" cited by Mr. Burgener and elaborated on the use of carbide bits. Two years ago, when the mine still was on the welded tungsten-carbide-tipped bits, four men were kept busy in the mine forging and tipping and 200 bits were used each machine shift in cutting 10 to 25 places. Cutting therefore was a bottleneck but now, with cemented tungsten-carbide bits, the cutter has extra time for considerable hitch work and delays are not as serious as they once were.

To reduce loss of bits, which still is about 10%, the section foremen are provided with bits in locked boxes and get credit for returning dulled or broken bits in the same boxes. Many bits are found in the bottom of the washbox. Consequently, a magnet is being installed in the plant to recover them before they go into the preparation equipment.

Advantages of Airdox shooting from date of first use to the present in the mines of the W. G. Duncan Coal Co., Greenville, Ky., were reported by W. O. Smith, general superintendent, as follows: less roof disturbance and secondary timbering; no smoke or fumes in the working places and no delays for clearing the face; elimination of the danger and cost of transporting and handling explosives as well as the cost of tamping materials; firmer coal, fewer rib and face falls as a result of less shattering; and increases in lump and egg percentage, boosting realization.

From 1938, much experimenting was done with explosives. Also, Cardox was used for several years until the war made it advisable to return to explosives. Meanwhile, improvement in hole arrangement and otherwise had reduced 1¼-in screenings from 54 to 46%. Introduction of Cardox brought a further reduction to 31%. The use of Airdox has materially increased the percentage of larger sizes, especially the 7-in lump.

Use of the Armstrong portable compressor coal breaker in mines of the Hanna Coal Co. was described by C. L. Sarff, of that company. This track-mounted unit includes a shield interlocked with the controls so that it must be raised into place to protect the operator's cab when the charge is released. At present, a 2½-in OD 460-cu in tube is used and the discharge pressure, controlled by a shear pin over a ½-in valve rod, is 8,200 lb. The machine includes a water tank and pump used to flush out the hole to minimize dust. Air pressure is built up in a receiver on the unit while the operator is placing the tube in the next hole.

One man comprises the crew, doing the job in 18 to 25 min per room, tramming included. Advantages in greater safety and better loadability indicate that the company will continue to use this portable air compressor for coal breaking. Of the three Ohio mines of the company, one is on permissible, one is on permissible and Airdox and the third is on Cardox and the Armstrong air method. The Armstrong machine is 43 in high, 15 ft long and 56 in wide.

C. C. Ballard, mechanical engineer, The New River Co., Mt. Hope, W. Va., presented a list of features desired in trailing-cable construction and performance. Principal among these are light weight and flexibility for handling; resistance to water, oil and mechanical damage; small dimensions; great strength of conductors; ground wires built to better advantage into off-track cables; resistance to damage if run over by equipment; a splicing method to eliminate over-sizing; greater resistance to flame and reduced noxious-gas generation in burning; and jackets which adhere tightly to the conductor insulation and are not deteriorated by the high operating temperatures.

Cable Care Stressed

In a comprehensive paper dealing with electric cables for face operation, E. W. Davis, chief engineer, Simplex Wire & Cable Co., emphasized the need for evaluating the efficiency of jacket compounds by their physical characteristics at high operating temperatures and after long service rather than when first applied to the cable. Current load should influence the minimum size of the conductor but this is not always followed in practice. Current-carrying capacities, in percentages of specified values, should be reduced to the following when cables are used with one or more layers wound on the reel: one layer, 85%; two, 65%; three, 45%; and four, 35%.

Mr. Davis decried the "backwards" method, used entirely too often, of determining cable-conductor size by the capacity of the cable reel which can be conveniently accommodated on a machine. His paper included tables of recommended current-carrying capacities for cables of various constructions and sizes, correction factors for different ambient temperatures and physical properties of natural rubber and neoprene compounds.

E. J. Gleim, U. S. Bureau of Mines, said that two recent fires have cast suspicion on the flame-resistant properties of approved cables, indicating that the present standard flame test may not be adequate, since it does not include the time in which the cable flame is snuffed out after the applied flame is removed. He said that better splicing of cable is vital. He also called attention to the changes in conditions growing out of, for instance, the continuous miner, in which intermittent operation is superseded by continuous duty.

Mining on Steep Pitches

Mining practices in the southern anthracite field, where many of the veins pitch steeply and extend 3,000 ft below the surface, were described by D. E. Ingersoll, division superintendent, The Philadelphia & Reading Coal & Iron Co., Pottsville, Pa., in the first paper at the Wednesday afternoon session on steep-pitch mining. S. J. Craighead, vice president, U. S. Fuel Co., Salt Lake City, Utah, presided.

The general mining plan used in the southern anthracite field involves, first of all, a water level tunnel, a slope or a shaft to provide primary access, Mr. Ingersoll explained. Rock tunnels then are driven at right angles to and across the measure, the various levels being spaced to allow some 300 ft along the pitch of the vein for mining. Gangways are turned in both directions off the main tunnels, either into the vein or into the underlying rock. In coal gangways, access for mining is provided by chutes driven on 60-ft centers and connected 10 yd above the gangway by a monkey heading or airway for ventilation. In rock gangways, holes from 7 to 8 yd are driven into the vein on 45-deg pitch. Each chute has a spout and hinged loading gate from which coal is loaded from each working place into mine cars on the gangway.

Naturally, Mr. Ingersoll explained, this general mining plan is subject to all the variations required by pitching and other conditions in individual mines and places. To solve specific problems, operators in the field have worked out their own plans, including the following:

1. Zig-zag or diamond method, in which the airway is driven on a slant across the pitch of the vein, followed by one slant chute on a 30-deg pitch and another along the bottom rock in the opposite direction but on the same pitch. The chutes are driven to their upper limits, finally intersecting and forming a diamond-shaped pillar. On retreat, half of each pillar becomes available to each place, each slant being robbed in two or three sections.

2. Slant method, a modification of the full-box method, involving the driving of headways or airways in the coal to connect the top of rock holes from the adjacent rock gang-

way, these holes occurring on 60-ft centers. Breasts then are driven across the pitch at 45 deg and against the bottom rock. This permits the use of post-and-bar timbering, with a center post separating the manway and the chute.

Steep-pitch practices in Alabama were discussed by I. W. Miller, general superintendent, Black Diamond Coal Mining Co., Birmingham, Ala. For example, one operation of the Southern Coal & Coke Co., working two seams averaging respectively 34 and 50 in and pitching from 26° at the outcrop to 10° at the present workings, uses a modified longwall method with conveyors. Cross entries are turned on 300- to 400-ft intervals, each being driven on a gradient of 2½ to 3% for a distance of some 2,200 ft. After an entry has been driven past the sidetrack and slope-barrier pillar, a narrow room or pair of rooms is driven straight up the dip to the entry above, using a chain conveyor. The outby rib of this room then is undercut with a longwall machine and advanced 300 to 400 ft, or to within 15 or 20 ft of the entry above. Coal is loaded on the conveyor by hand and discharged into a second chain-and-flight conveyor alongside the upper side of the entry track. Recovery averages 95% by this method, Mr. Miller reported.

After describing other steep-pitch methods in Alabama mines, each fashioned to meet the special needs of local seams, Mr. Miller concluded that the future for increased mechanical mining of the dipping seams in Alabama is not promising, largely because of growing competition from natural gas and oil and the increasing cost of producing coal under these difficult conditions.

Mining two seams, one pitching an average of 30 deg with extremes up to 50 deg and the other averaging 15 deg, was described by T. H. Wilson, general manager, Crow's Nest Pass Coal Co., Ltd., Fernie, B. C., Canada, whose paper concluded the steep-pitch mining session. In general, the method used is a panel system, as follows: Two places are driven at 60-ft centers up the pitch from the main entry. In one place, a hoist and track are installed for hauling materials. Alongside the track a chain conveyor is installed, feeding coal to a loading chute at the main entry. As the inclines are driven, rooms are broken off on each side, rooms being driven and pillars being taken right up to the top. The same system is followed coming down on the other side. A 250-ft block is left between each pair of rooms. Modifications to fit various spot needs can be made easily from time to time. All machines are powered by compressed air and gas and dust in the mine make adequate ventilation a real problem, Mr. Wilson explained.

Advances in Stripping

STRIP-MINE OVERBURDEN generally falls into one of four classifications—earth, loose rock or gravel; shale or soapstone; limestone and hard sandstone—according to Howard S. Frisbie, assistant superintendent, Broken Aro Coal Co., Okmulgee, Okla., the first speaker at the strip-mining session Tuesday afternoon. K. A. Spencer, president, Pittsburg & Midway Coal Mining Co., Kansas City, Mo., presided.

Usually, no difficulty is met in drilling or shooting earth, loose rock, gravel, shale or sandstone but no satisfactory method in point of cost or efficiency has yet been found for handling limestone or sandstone. However, progress is being made at the Homestead Coal Co. mine, near Earlington, Ky., where hard sandrock overlies the No. 12 seam and 6 ft of solid limestone lies between the No. 12 seam and No. 11 next below. At this operation, the limestone is drilled by two wagon-type jackhammer drilling machines built at the mine and mounted on crawlers. Each machine carries its own compressor. On the front end of the crawlers, three Sullivan drill jibs are mounted 4 ft apart. The jibs are 8 ft long and are so rigged that by swinging them to the side, three rows of holes may be drilled as much as 12 ft apart or any lesser distance. A drill assembly is mounted on the end of each jib, boring a 2⅜-in hole.

A crew consists of one man for each jackhammer. Crewmen load the holes as the machine drills them and the holes are shot about once in 24 hours. A steel-plate canopy is built over each drill to protect the machinery from falling rock and weather. Advantages cited by Mr. Frisbie for these drills are: (1) they are mobile and compact; (2) the jackhammers may be operated at any angle or spacing without delay; (3) servicing is simple because they are close to the ground; and (4) footage is sufficient to keep ahead of the stripping.

Drilling Hard Sandstone

To drill the sandstone above the No. 12 seam, a special machine is being built by engineers of the Sinclair Coal Co. and the Bucyrus-Erie Co., Mr. Frisbie stated. The machinery will be mounted on crawlers. On the drilling end, two hydraulic jacks will be mounted, with a single jack at the other end to keep the machine level. Over-all dimensions of the machine will be: length, 18 ft; width, 13 ft; height, 13 ft.

Instead of a mast or tower, a horizontal boom will be built and a de gearmotor will be installed on the end. Near the center of the boom, a hinged arm will be connected to a stiff gantry on the drilling end. At the boom center, a vertical hydraulic piston will raise or lower the boom, forming an arc which will be offset by an opposing arc formed at the boom center. Thus the point where the drilling motor is installed will travel in a nearly vertical line.

Electrical equipment on this latter drill will provide high speeds at light loads and slow speed and high torque at heavy loads, said Mr. Frisbie. The hydraulic system will lower and raise the augers, level the machine and exert pressure on the augers, he pointed out.

Scan Use of Explosives

Blasting with liquid oxygen and with fixed explosives was discussed respectively by Don B. McCloud, president, Airmite-Midwest, Inc., DuQuoin, Ill., whose paper was read by D. E. Albon, chief engineer of the company; and by A. B. Austin, assistant district manager, Hercules Powder Co., Chicago, Ill.

Liquid-oxygen explosive is used almost exclusively in many large strip mines, and procedures have been mapped out to meet the conditions of various jobs, said Mr. McCloud. Formerly, a large oxygen plant requiring considerable capital outlay was needed near the stripping area. Now, however, these plants have been replaced by efficient storage tanks supplied by tank-car deliveries from a large commercial-oxygen producer. The cost of obtaining oxygen in this way compares favorably with the cost of operating a special plant. There are eight such preparation plants now in the coal-stripping industry, some of which supply two or three neighboring mines.

Airmite requires special handling procedures, Mr. McCloud continued, because of the 300-deg-below-zero boiling point of liquid oxygen, which causes saturated cartridges to lose their effectiveness after 45 min to an hour of exposure to the open air. To solve this problem, a good many mines have adopted the practice of single-hole shooting; that is, shooting a hole immediately after it is drilled. Others have developed speed to the point where the loading crew can load 14 holes with 2,500 lb of Airmite and set off the charges within 45 min. On the safety side, during the past 20 years Airmite has not been involved in a fatal accident, Mr. McCloud reported. Airmite shows up best in extremely hard rock where its high rate of detonation produces unusual shattering effect and the high volume of gases generated produces unusual displacement, he said.

Fixed explosives are convenient and economical to transport, store, handle and load, declared Mr. Austin. In addition, they give uniform results, enabling engineers to reduce blasting uncertainties to a minimum. Developments in fixed explosives that are of

special value to strippers include the perfecting of high-count ammonium-nitrate explosives to replace the denser gelatin and nitroglycerin grades, with consequent cost savings and improvement of safety; improvement in water resistance; and availability in a wider range of strengths, rates of detonation, sizes, water resistance and other qualities, Mr. Austin said.

In selecting the right explosive for a job, engineers must consider the physical characteristics of the bank, its height, the material, the drilling equipment available, the digging equipment to be used and the method that will produce the best fragmentation and displacement, Mr. Austin explained. The drill pattern will depend upon these factors. A single row of horizontal holes should be drilled so that the resistance of the material above the holes will roughly equal the resistance of the material between.

Usually, shale overburden can be blasted successfully with a single row of horizontal holes if they are large enough to permit the proper loading ratio. As banks increase in height, it becomes necessary to increase the size of the hole, since holes drilled closer together tend to shear rather than produce the desired fragmentation. Other methods for handling deep cover include drilling high and low holes and drilling a combination of horizontal and vertical holes, as well as shooting against a buffer.

Tower Rig Moves Deep Cover

Use of a tower excavator when overburden is too deep for a single dragline or shovel or when the material is unstable either in the highwall or the spoil pile was described by Harold N. Hicks, engineer, Fiatt, Ill., and Howard Truax, general superintendent, Minot, N. D., both of the Truax-Traer Coal Co. The tower excavator, originally designed and built for levee work, comprises a head tower, a tail tower and a scraper-type crescent bucket. Though the yardage output cannot be compared with that of high-speed modern draglines and shovels, the tower excavator does serve the special needs of strip operators in handling unstable material.

A good deal of preparatory work is needed to use a tower excavator, Mr. Hicks and Mr. Truax explained. For the head tower, a 90-ft-wide road must be prepared on the spoil the entire length of the pit and parallel to the cut, a minimum of six cuts distant from the operation cut. Once the road is built, the excavator starts the construction cut, with the head tower on the spoil road and the tail tower on the highwall.

The job involves pulling back the spoil piles from the cut and developing a 15-deg slope from the last cut, sloping upward toward the head tower. After the construction cut is completed, the tower returns on the same road, taking highwall as it goes and depositing it as a blanket on the 15-deg slope of the spoil. When the first highwall cut is completed, the tower can be moved closer to the pit, moving along a new road that can be built easily by a bulldozer on the 15-deg spoil slope. Messrs. Hicks and Truax concluded by urging manufacturers to build a new type of tower excavator incorporating improvements, particularly electrical, that would materially increase the output of the machines.

Factors in Using Big Shovels

Deep stripping methods with large shovels were discussed in a joint paper prepared by Andrew Hyslop, chief engineer, and Russell McHugh, chief engineer for stripping, Hanna Coal Co., St. Clairsville, Ohio, and presented by Mr. Hyslop. Large shovels were defined as those having capacities of 33 to 50 cu yd and booms and dipper handles sufficiently long to remove overburden up to 70 or 80 ft.

Summarizing economies effected in the use of large shovels at Hanna operations, the authors stated that removal of overburden between 9 ft and 50 ft by a 45-yd shovel costs about 45% of what it would cost to do the job with an 8-yd shovel; overburden between 9 ft and 80 ft, about 77% of the cost of an 8-yd shovel stripping between 9 and 50 ft; and overburden between 50 and 80 ft, about 25% more than the cost of 9- to 50-ft overburden removed by an 8-yd shovel. In addition, large shovels, with their greater stripping ranges, recover coal that would have to be left by small shovels or would have to be deep mined.

However, the area to be stripped must contain enough coal to warrant the high capital outlay required for the purchase of a large shovel. Demand for coal and possible price also must be considered, he said. To earn maximum returns from the equipment, maximum-capacity operation consistent with good maintenance practices is essential. To find this point of peak capacity involves analysis of permissible bail pull, maximum swing speed, most advantageous length of boom, the shape of the digging element and other considerations.

Showing improvements in performance and cost achieved by increasing dipper size from 40 to 45 cu yd, after exhaustive studies of special alloy steels to increase strength and reduce weight, dipper-lip design, tooth design and welding procedures, the following comparison resulted:

	40-yd Dipper	45-yd Dipper
Seconds per pass	64	62
Yards bank measure	24.6	29
Crowd power per pass, kw	0.76	0.67
Kw-hr per pass	12.0	12.2
Increase in capacity	...	18.5%
Increase in power required	...	2.0%

Practices in the use of large draglines in bituminous strippings in hilly country were reviewed by A. E. Dick Jr. president, and D. B. Dick, Dick Construction Co., Hazleton, Pa. Their paper was read by L. D. Lamont, The Philadelphia & Reading Coal & Iron Co., Pottsville, Pa.

In Virginia, West Virginia, eastern Kentucky and western Pennsylvania, where the Dick organization has done most of its bituminous stripping, flat coal seams and the steep slopes cause overburden to increase rapidly as successive cuts advance into hillsides. For these difficulties, the large walking dragline is most useful because of its long dumping range. In other words, the stripping life of the property is increased roughly in proportion to the dumping range of the dragline, the authors pointed out. In addition, the maneuverability of the walking dragline is advantageous in working sharp re-entrant angles and inside curves in heavy overburden.

On the other hand, there are some disadvantages in the use of draglines, the authors warned. For example, the machine must have a suitable base or roadway from which to operate. This sometimes is difficult to provide in rocky overburden and its cost must be considered in choosing between dragline and shovel operation.

Good Bank Preparation Needed

For best results, the bank must be well prepared. When overburden depth exceeds 50 ft, vertical drilling is the best procedure, two-level horizontal drilling being too costly and single-level horizontal drilling being inadequate. Contrary to usual opinion, the authors stated that it is not necessary to shoot a bank harder for a dragline than for a shovel.

It sometimes may seem advisable to use large walking draglines and stripping shovels together; for example, when the initial cut would be made by a shovel and subsequent cuts by both machines. The problem in this case is that there now is no highly mobile heavy-duty long-range shovel available to work with the dragline and that the present highly mobile shovels lack the range and capacity needed.

Touching on the economics of the strip-mining industry, the authors stressed the need for a long-range sales program for stripped coal. The first step, they pointed out, is to dispel the notion that strip coal is of inferior quality. Next, strip operators should prepare themselves to market a quality product, well cleaned and sized, even at the expense of large capital expenditures. Finally, every effort should be made to keep stripping costs low as a bulwark against the encroachments of natural gas, petroleum and water power.

Deep stripping on pitching beds in the western Middle and Southern anthracite fields was reviewed by C. E. Brown, mining engineer, The Phila-

delphia & Reading Coal & Iron Co., Pottsville, Pa., the first speaker at the strip-mining session Wednesday afternoon. E. F. Stevens, vice president, Pyramid Coal Corp., St. Louis, Mo., presided.

Beds in the area described pitch 5 to 90 deg and some are on the inverted, with sharp folds and faults, Mr. Brown pointed out. The survival of some of these operations is a tribute to engineering skill. The locations of stripping areas, he explained; are determined by analysis of the following elements: (1) construction of cross-sections over the area and sufficient drilling to classify the strata and determine the location, thickness and pitch of the coal; (2) coal samples from proving cores; (3) distance from the stripping to overburden-disposal areas; (4) the most economical plan of operation and the proper equipment; and (5) the depth of cut, the quantities of overburden to be removed and the highest ratio that can be economically stripped.

Large Strip Mines Described

Five large deep stripping operations were described by Mr. Brown: Monitor, at Mt. Carmel; Beechwood, near Minersville; Shenandoah, at Shenandoah; Wadesville, near St. Clair; and Trevorton, at Trevorton.

The Monitor operation requires the removal of a basin 275 ft deep. The area had been first and second mined, resulting in partial or total collapse of overlying strata. Pioneering with 9-in blast holes has eliminated the need for secondary drilling. In 1948, 2,750,000 cu yd of overburden was removed with an average of 0.68 lb of explosive per cubic yard. Two electric shovels load overburden from 25-ft benches into a fleet of 30 trucks from 10 to 19 yd in capacity. All-weather roads are built from selected pit materials, with only three days out of the last five years being lost because of bad weather. The vertical lift between origin of overburden and disposal is 500 ft. Limited to a maximum 8% grade, a 6,200-ft haulage road is confined within an area 4,000 ft long. As parts of the pit are completed, they are used for backfilling to reduce the average length of haul.

Because of a fault in the vein, the Beechwood stripping will reach a depth ranging from 300 to 400 ft, Mr. Brown continued. Earlier, in 1942, two draglines rolled the overburden back to the limit of the project, rehandling the material three times. Ramps were built to maneuver the draglines from levels 100 to 200 ft below the surface to spoil piles 200 ft above the surface. State highways, power lines and water lines were relocated to provide overburden-disposal areas. Later, in 1945, when trucks became available toward the end of the war, overburden removal was shifted to two 4-yd shovels operating on 25-ft-deep benches and loading into trucks. Using an 8% ramp, the western section has been completed and now is used for backfilling overburden from the eastern section. This same ramp is used to haul coal from the pit to the cleaning plant.

The Shenandoah operation eventually will cover 291 acres and maximum depth will be 400 ft. A big complicating factor in this operation is an active fire underlying the deepest vein that will be mined. The fire now is being encountered in overburden removal. It is estimated that 6,000,000 cu yd of overburden surrounding and within the fire area must be removed within the next two years before the fire is put out or cut off. Overburden is being hauled an average of 3,200 ft on an ascending 7% grade to five disposal points, a fleet of 65 trucks being used on the second and third shifts. On the first shift, 20 to 30 of the trucks are used for hauling coal. Twenty-one churn drills working two shifts keep ahead of seven overburden shovels.

The Wadesville operation is a straight shovel job, overburden being hauled in 19-yd trucks. Started in January, 1949, the pit will be enlarged to remove 30,000 cu yd of overburden and 4,300 tons of rough-cleaned coal per day. The pit will reach a depth of 300 ft and a troublesome water level will be reduced as the pit deepens

Stripping a Pitching Seam

The Trevorton stripping, covering an area of six square miles, now is using three draglines and a shovel on three shifts for overburden removal, Mr. Brown said. Coal, loaded on two shifts, is hauled three miles to the preparation plant. The veins being stripped pitch from 5 to 75 deg and range from 5 to 37 ft in thickness. Two-thirds of the area stripped to date has been previously first and second mined. Top cuts are being worked off on 25-ft benches by straight shovels and overburden is hauled by trucks. Later, when the depth is reached where the 22-yd dragline can handle the overburden, two pits will be worked in conjunction. This project differs from other projects described in that terrain and geology on the whole favor the use of draglines to remove overburden.

Concluding, Mr. Brown summarized features that make operations of such size as these economically sound, as follows:

1. Each subdivision uses specially trained personnel to achieve maximum efficiency.

2. Adequate maintenance shops, carefully planned moves for overburden shovels, proper layout of blast holes, skilled supervision for loading and firing blast holes, well-planned transportation and good road maintenance keep operations moving on schedule with a minimum of breakdown.

3. Better stripping equipment, planning and supervision have increased the ratio of overburden removed to coal removed.

Modern aerial mapping offers advantages in cost, speed, accuracy and detail over ground-mapping methods, declared George Hess, photogrammetric engineer, Aero Service Corp., Philadelphia, Pa. Aerial mapping delivers three major products to strippers, as follows: stereo pairs of photographs for geologic study, mosaics for quick reconnaissance purposes and topographic maps for detailed development planning.

Mr. Hess explained that stereo pairs of photographs show an area's relief in third-dimensional perspective, revealing details that a ground party might miss because of brush or for other reasons. Mosaics, though not so accurate as a topographic map, reveal detail in a minimum of time, are good for nearly all purposes except where contours are required, and help to select the areas that must be contour-mapped. Finally, contour mapping, done with the same photographic negatives used for stereos and mosaics, reveals all the features sought for stripping and is cheaper and more accurate than mapping by ground parties.

Commenting on the cost of aerial mapping, Mr. Hess cited a recent survey of 2,045 acres by ground methods costing $2.92 per acre. Aerial mapping of a 7,210-acre area with similar topography cost $1.84 per acre. Thus, for areas of 1,000 acres or larger, aerial mapping delivers a substantial saving but on smaller surveys the savings are materially less, Mr. Hess said.

Power Distribution Improved

At most strip mines today, the 4,160-volt three-phase Y-connected system, complete with neutral grounding resistor for protection of workers, is used, said John J. Huey, electrical engineer, The United Electric Coal Cos., Chicago, Ill. Conventional open-line construction, though simple, rugged and reasonably free from interruption, is costly to set up and move, requires frequent shortening of laterals and considerable lightning protection, and is hardly adequate for the modern type of large stripping unit at present voltage. Hence, there is a trend toward all-cable distribution or combination open-line and cable distribution, Mr. Huey reported.

In building the main line as an open overhead unit, the line should be straight as possible, main conductors should be as long as can be pulled—up to approximately one-half mile for 4/0 copper—and anchoring facilities should be ample. The problem is simplified by shortening spans from the usual 150 to 175 ft down to about 125 ft, Mr. Huey explained. Other recommendations offered by Mr. Huey were: (1) stranded conductor be used for sizes larger than No. 2; (2) ground wire be equal in size to phase conductors except for the larger sizes;

(3) the ground wire be placed on the crossarm between two of the phases; and (4) the ground wire be grounded to the earth at every third pole.

Full-cable distribution, as contrasted with open-line or combination construction, has been made possible by improvements in cables, connectors, and skids or switch houses, Mr. Huey stated. Likewise, the development of self-contained substation units, complete with three-phase transformer, switchgear and lightning arrestors, now makes it possible to relocate the substation frequently and provides improved power delivery to the pit. In addition, since no dismantling or disassembly is required, the substation can be moved in a few hours with little labor cost.

Single Metering Point Urged

It is desirable also for the operator to own not only the unit substation serving the pit but also the substation serving the preparation plant, as well as the interconnecting high-voltage lines, to provide a single metering point, Mr. Huey stated. A single metering point offers the following advantages: (1) an additional voltage metering discount; (2) improved power factor; (3) reduced maximum demand charges; and (4) reduction in energy losses because of the regenerative nature of portions of the stripping cycle.

Distribution of power in various directions at each terminus can be provided by a junction sled, with incoming cable terminated on stand-off insulators and leads branching to three sets of disconnecting blade switches, Mr. Huey explained. One set of blades feeds to the next sled while the other two feed the pit equipment near by. Cables are equipped with terminals rather than connectors or nips. The sleds, enclosed by sheet steel, can be locked to prevent tampering. To provide protection if one machine or cable fails either to ground or from phase to phase, accurate induction-type overcurrent relays with differing current and time settings can be used.

To prevent injury to workers, there must be a continuous metallic ground of 4, 160-volt cable from the substation to the pit, Mr. Huey continued. Protection for the 480-volt system can be provided very simply, he added. However, the big need of strippers, in view of frequent deficiencies in power supply, is some sort of rough voltage-regulating device that will boost voltage whenever the current rises to a given value.

In operating big pit equipment, terminal voltage should be maintained as close to rated value as possible, said David Stoetzel, application engineer, Mining Division, General Electric Co., Schenectady, N. Y. Large machines create high momentary peaks, up to 200% of normal rating, once during each cycle of operation. These peaks are followed by valleys of regeneration. Operation of several machines on the same power line, however, will average out the power demand and will level peaks. Some of the larger machines now in use, employing synchronous motors, are equipped with power-factor-regulating devices to provide power factor close to unity throughout the range of loads, he reported.

Continued developments in stripping equipment are demanding better power distribution, Mr. Stoetzel pointed out, as well as better protection against outages. To provide better service, he recommended use of portable unit-type equipment, such as substations, hill-type cable skids and pit-cable skids. For better safety on 4,000-volt lines, he urged limiting fault current to 50 amp by inserting a resistor at the neutral point of the distribution transformer secondary. A similar safety setup is available for 440-volt lines, limiting the current to 5 to 10 amp. Lightning protection for pole-line distribution should be provided every 2,000 to 3,000 ft and at the points where feeder lines or cables tap off the main line.

Studies now are in progress with a view to further improvement in portability, easy disconnection and reconnection of cables and units, and automatic operation of the electrical system required for strip mining, Mr. Stoetzel concluded.

Reclamation of stripped lands cannot be realized through legislation without a factual basis nor on theory alone, declared A. G. Chapman, chief, Central States Forest Experiment Station, Columbus, Ohio. On the contrary, reclamation principles must be flexible and revised from time to time to meet new situations. The use of spoil banks should be determined by what they are capable of producing or providing and by the needs of the landowner and the interests of the community, he added.

Reviewing highlights of a recent report (Technical Paper 109) on a survey of stripped lands in nine states, completed in 1948, Dr. Chapman reported that approximately 190,000 acres have been stripped in those states. About 95% of this stripped area can be reclaimed by some kind of forest cover, the remaining 5% being highly toxic. Besides toxicity—a pH of 4 or less is too toxic for most plants—texture of bank materials, general topography, aspect of slope, stability of banks and the vegetation found on banks at the time of planting are important influences in determining the use to which spoiled lands should be put. Next to toxicity, texture probably is the most important factor, Dr. Chapman stated. For example, silty loams with some fine sand are best suited to tree growth but tight clay is not suited to trees. In addition, trees grow best on unleveled banks, since leveling machinery compacts the soil.

Several hundred acres of experimental plots now are being tested for species adaptation, mixtures of species, direct seeding, methods of planting, moisture conditions and best management practices, Dr. Chapman reported, and experiments will continue. Meanwhile, forestry officials feel that research has developed to the point where two or three pilot-plant studies of multiple land use—that is, integration of all possible uses within an area, such as grazing, forests, recreation and others—can be undertaken.

Commenting on Dr. Chapman's address, L. E. Sawyer, Indiana Coal Producers' Association, Indianapolis, Ind., contended that blanket recommendations for spoil-bank use are worthless because they do not consider the various characteristics within an area or even within the same spoil bank. "Bank reclamation is a new science and we have barely scratched the surface. Technical Paper 109 is the first real contribution of extensive research in the problem," Mr. Sawyer declared.

Preparation Refinements

BASED LARGELY ON EXPERIENCE in the operation of the 800-tph Dorrance central cleaning plant, maintenance of preparation equipment was discussed by H. D. Bowker, assistant general manager, in a paper read by T. R. Workman, vice president-operations, West Virginia Coal & Coke Corp., Omar, W. Va., at the Monday afternoon meeting. In brief, the rules to be followed in attaining maximum operating time at a reasonable cost are: regular and systematic inspections, planning of maintenance work well in advance, execution of the work in an efficient manner, keeping of adequate records of work done and materials used, ordering promptly and keeping on hand essential parts.

Maintenance should be a major consideration in plant design, declared Mr. Bowker. At Dorrance, all conveyors were set to run at 75 fpm, providing a maintenance reserve if, for production reasons, it should become necessary to speed them up. Farval centralized equipment has helped materially in reducing maintenance by increasing the efficiency of lubrication.

Records kept to show the comparative service life of various items include the following: mild-steel plate v. high-carbon for chutes and conveyor bottoms, mild steel v. stainless and high-carbon for screen cloths and plates, roller chain v. drop-forged and high-manganese rivetless, metal flumes v. cement- and rubber-lined,

and metal valves v. rubber-lined and pinch types for water-carrying solids.

Merely requisitioning replacement parts for units in service is not always the answer to a low maintenance cost. Records have shown that in some instances it is more profitable to replace certain units or materials with something different. An equipment inspector is employed in the Dorrance plant and works directly under the plant superintendent in making regular and continuous inspections and lining up maintenance work to be done on the off-shift. No job is considered more important.

The coal industry needs a manual on preparation-plant maintenance, including information on the proper steels to use, declared J. M. Vonfeld, Pittsburgh Coal Co.

Dewatering and thermal drying of bituminous coal aims at removal of all or part of the surface moisture of the fine coal being treated, said Orville Lyons, research engineer, Battelle Memorial Institute, Columbus, Ohio, lead-off speaker at the Wednesday morning session. H. H. Otto, assistant general manager, The Hudson Coal Co., Scranton, Pa., presided.

Removing Surface Moisture

Major conclusions reported by Mr. Lyons were as follows: (1) the shaking screen can be used for dewatering plus $\frac{3}{8}$-in coal but other equipment should be used if minus $\frac{3}{8}$-in coal must be dewatered to less than 5% surface moisture; (2) mechanically vibrated screens can be used to dewater minus $\frac{3}{4}$-in and minus $\frac{1}{2}$-in coals to a final surface moisture of 3% but normal procedure is to use vibrating screens to provide dewatered fine coals with final surface moisture in the range of 5 to 10%, the minus 28-mesh fraction being removed with the underflow water and dried by other methods; (3) choice of a centrifuge depends on the moisture desired in the dewatered cake, the market possibilities for minus 28-mesh coal when mixed with coarser sizes and the methods of disposing of waste product; (4) by means of established relationships and a few simple tests, it is possible to predict within limits the final moisture content to be expected when either drum- or disk-type filters are used to dewater slurries or sludges; and (5) assuming that prior mechanical dewatering reduces surface moisture to 5 to 10%, all types and makes of presently manufactured thermal dryers can be operated with equal effectiveness if each type is used to dry the sizes for which it is best suited.

How a thermal dryer is used to remove moisture, acquired in mining, from $\frac{3}{8}$x0-in slack preliminary to pneumatic cleaning was described by J. C. Johnston, preparation engineer, Eastern Gas & Fuel Associates, Powellton, W. Va. Inherent moisture in the coal treated is from 1 to 1.2% and total moisture in the coal reaching the dryer ranges between 3.5 and 7%, he explained. The plant is Link-Belt Multi-Louvre, selected primarily to fit the size of coal to be dried.

Originally, Mr. Johnston reported, exhaust air from the dryer carried out about 70% of the 48Mx0 coal, which was fed into the furnace as fuel. However, it soon was found that the fly ash drawn through the dryers contaminated the coal, that no bed of hot coals was sustained in the furnace floor, that fly ash was deposited on the walls of the furnace and that the dust sometimes ignited in the feed bins ahead of the stokers. For these reasons, the furnace feed was changed to raw $\frac{3}{8}$-in slack, with better operations resulting. To remove fine dust from the exhaust, a wet-type air tumbler is installed. This has reduced the grain loading from 6 to 0.07 grains per cubic foot.

Dryer Improvements Asked

Mr. Johnston made two recommendations for improving the dryer, as follows: sectionalized construction of the furnace to reduce the cost of relining, and use of an abrasive-resistant steel in the lining of the air tumbler. Although the plant is largely automatic, he advised having an operator who would divide his time between the dryer and other cleaning-plant duties. "Experience with the dryer indicates that the outlet temperature control equipment is vital because, without it, damage to the dryer may result," Mr. Johnston concluded.

Surface moisture is the critical factor in screen performance, said W. R. Caler, preparation engineer, Enos Coal Mining Co., Oakland City, Ind. There now are no accurate methods for determining surface moisture quickly, yet best screening results depend upon exact information on moisture content and specific gravity, he pointed out. The problem is made no easier by the fact that moisture varies with mining methods, humidity, dew point, weather and other factors.

Need Way to Measure Moisture

Distinguishing between free, surface and inherent moisture, Mr. Caler declared that whereas free water, such as is added by underground sprays to allay dust, often is a help in screening coal, surface moisture is a critical factor in successful screening, often blinding the screens entirely. Basic research still is needed to devise ways of measuring moisture accurately and to help operators predict the effectiveness of screening, Mr. Caler declared.

The first major modern preparation plant in the anthracite region using magnetite as the washing medium was described by Edgar Schweitzer, mechanical engineer, Lehigh Valley Coal Co., Wilkes-Barre, Pa., who read a paper on the dense-media separation process prepared jointly with H. R. Randall, president, Rhoads Contracting Co., Ashland, Pa. The plant, operating since Jan. 1, 1949, at the Park No. 1 colliery near Mahanoy City, is described starting on p. 84 of this issue.

Industry Problems

"IT APPEARS THAT we have mineral-fuel resources for 100 to 300 years and that we will have improving conditions of supply for the near future," declared Dr. Arno C. Fieldner, chief, Fuels & Explosives Division, Bureau of Mines, who was the first speaker at the utilization and marketing session Tuesday morning, H. H. Taylor Jr., president, Franklin County Coal Corp., Chicago, Ill., presiding.

Reviewing reserves and current rate of use of bituminous and anthracite, natural gas, petroleum and lignite, Dr. Fieldner pointed out that recoverable coal, based on 50% recovery, makes up 95.5% of the nation's fuel reserves; recoverable oil from oil shale, 3.5%; proved natural gas, 0.5%; and proved petroleum, 0.5%. Some downward revision later may be required in estimates of recoverable coal, however, and the Bureau of Mines, together with the Geological Survey, now is reappraising coal reserves, with special attention to coking-coal reserves. The survey, beginning with the eastern province, will continue with similar studies in the interior and western provinces of the nation.

Meanwhile, other studies recommended by the National Bituminous Coal Advisory Council are under way on factors affecting pillar extraction and recovery and on the performance of selected coal-preparation plants, Dr. Fieldner said. In this connection, he observed, the continuous mining machine may boost the present average rate of recovery, which now stands close to 65%, and thus aid in conservation of fuel resources in the years ahead.

Even though estimates of coal reserves may be scaled down, said Dr. Fieldner, coal must remain the backlog to serve fuel needs and supplement natural gas and petroleum as demand for these fuels exceeds supply. For example, he pointed out, two billion barrels of synthetic liquid fuel per year would require a billion tons of bituminous coal. Likewise, underground gasification of coal, if successful, may stretch our fuel reserves even further, making possible the recovery of coal in beds too thin to mine by present known methods.

In addition, the work of Bureau engineers, aimed at beneficiation of low-rank western coals, holds some promise of making more fuel available, if practicable methods can be found to gasify or liquefy those coals, and of relieving the drain on ever-diminishing reserves of coking coal in the East.

Coal Gasified Underground

Commenting on Dr. Fieldner's address, H. M. Johnstone, Alabama Power Co., Gorgas, Ala., revealed what is being learned now in the second underground gasification experiment at Gorgas, Ala. Having learned from an earlier experiment that there is no difficulty in maintaining combustion, that changes in the roof strata following burning are favorable to the process, that coal is completely consumed, and that at least a low-quality gas can be produced, engineers at the site fired a new block of coal of greater extent and under deeper cover March 18, 1949. With an elaborate system of pipes and valves, the flow of gas and air is being reversed every 9 hr, when the stack temperature reaches approximately 700 deg F. Thus far, 150-Btu gas has been obtained, together with some tar oils. Mr. Johnstone's comments were read in his absence by E. W. Booker, also of the Alabama Power Co.

Financial problems of the industry, together with some recommendations looking to their easement, were analyzed by T. H. Bierce, assistant treasurer, Rochester & Pittsburgh Coal Co., New York City. Pointing out that capital erosion during a period of rising price levels affects fixed capital, inventories and cash, Mr. Bierce stated that recovery of the original cost of fixed assets through depreciation not only is slow but, if the price rise is sharp and permanent, may be totally inadequate. Though the last-in first-out method of computing inventories has helped in some businesses, it has been of no great service to the coal industry, which deals largely in depreciable assets of relatively long life. This condition in coal requires the immediate attention of accountants, management and taxing authorities and the sympathetic understanding of stockholders, customers and employees.

Among the steps Mr. Bierce suggested for easing coal's financial problems were the following: (1) depreciation policy based on replacement cost rather than on original cost; (2) revision of accounting procedures to compensate for currency depreciation; and (3) revaluation of assets, including not only depreciable assets but depletable assets as well. Concluding, he declared that "regardless of what is or is not done with respect to depreciation policies and tax laws, business can prevent further capital erosion by setting selling prices at a level high enough to provide profit accumulations, after taxes and dividends, which are adequate to provide capital replacements at the present high price levels. This should be done on an industry-wide basis, and should be done now."

"Looking to the distant future, the outlook for fuels places coal in a favorable spot. . . . The future is bright but still it is too far ahead to give solace for the competitive bruises incurred now and the threat of bumps in the several years to come," declared George A. Lamb, manager of business surveys, Pittsburgh Consolidation Coal Co., Pittsburgh, Pa. Predicting a growth of 25% in gross national product between 1947 and 1965, Mr. Lamb indicated that petroleum possibly would increase 30% in that period, natural gas 60% and coal tonnage 12%, resulting in a market for some 700,000,000 tons of coal 16 years hence. To obtain a bigger share of the growing energy market, coal must develop products that fit changing demands, he argued.

Predicts Tonnage in 1949

Prospects for the short-term period ahead, according to Mr. Lamb, include a further market shrinkage in 1949, though volume of sales will continue to be higher than prewar; increasing competition in the fuels market; perhaps some increase in utility consumption of coal; firm demand for coking coal; and continued decline in coal's railroad market. Adding it all up, Mr. Lamb predicted the following coal-market figures for 1949:

	Millions of Tons
Railroads	80
Electric power utilities	100
Coke ovens and steel	114
Others (largely manufacturing and retail)	186
Exports	35
Total	515
Less stocks	5
Net	510

Although coal is in a strong financial position and faces promising opportunities in the years ahead, it must plan its course carefully and must seek more information about its consumers and their needs and about the over-all energy market, Mr. Lamb warned.

Technologically, coal has made big strides in past years but it still needs to know more about its customers and how to interpret its markets, declared Julian E. Tobey, president, Appalachian Coals, Inc., Cincinnati, Ohio, in discussing Mr. Lamb's address. Coal's greatest strength is in the industrial field, Mr. Tobey pointed out. As for other markets, there is some hope for coal in improvement of the conventional steam locomotive and great hope in development of coal-fired gas-turbine locomotives.

Coal probably will continue to be hurt in the domestic field, as is indicated by recent declines in the sale of stokers, though there is some promise of holding a good part of this market by developing better stokers and improving hand-fired domestic equipment. Coal men need not worry about atomic or solar energy in the years ahead because the chief competitors will remain oil and natural gas. Even so, the price of gas at the well probably will double or triple in the next several years and thus improve coal's outlook considerably, Mr. Tobey predicted.

Safety a Personal Problem

"From management must come the inspiration, the financial backing, the moral support, and the guidance and direction in originating and developing a comprehensive safety program," said C. W. Connor, manager, mining division, Armco Steel Corp., Montcoal, W. Va., the first speaker at the Thursday morning session on management. L. C. Campbell, vice president, Eastern Gas & Fuel Associates, Pittsburgh, Pa., presided at the meeting.

Mine safety remains largely an individual matter and the attainment of perfect mine safety rests primarily in the individual mine worker, Mr. Connor said. Mutual confidence must be the key to the successful safety program. Speeches, posters, slogans and other promotion devices alone are not enough to win worker confidence, he warned, pointing out that visible activity by the employer to improve working conditions and eliminate hazards must accompany management's safety work. In addition, workers must be led to understand the reasons for rules, regulations and practices through group meetings, safety meetings, radio talks, motion pictures and personal talks by mine officials and the safety engineer.

A safety department headed by a skilled safety engineer pays its own way by reducing accidents, saving compensation payments and increasing productivity, Mr. Connor added. Impartial enforcement of safety rules and mining laws, together with clear instructions by supervisors, also are essential for good results in safety. Likewise, management must accept the responsibility for training new men and for keeping supervisors up to date on job-training and safety-training methods, as well as on new equipment. In fact, Mr. Connor declared, supervisors can make or break a safety program, depending on whether or not they are trained for their responsibilities. "Further training our foremen in their selling jobs is the most important job that management can now undertake to prove that safety is something more than a slogan," he stated.

Declaring that the international union has stressed legislation in its safety efforts rather than cooperation, Mr. Connor cited examples of union-management cooperation on the local

and district level that have paid off in better accident records. He urged that greater efforts be made to gain the backing of local unions for safety measures. The individual, however, remains the key to confidence and cooperation, and if he is kept informed about the plan and its results, his enthusiasm will stay at high pitch, Mr. Connor concluded.

The proper approach to safety is psychological, declared John R. Foster, superintendent, New Orient mine, Chicago, Wilmington & Franklin Coal Co., West Frankfort, Ill., who led a discussion of Mr. Connor's address. Mr. Foster listed the following cardinal points in safety improvement: (1) company executives must back safety measures even though they appear to slow down production; (2) section foremen must be sold on safety; (3) workers themselves must believe in safety and practice it; (4) cooperation of the local union is desirable in training and disciplining men; (5) the safety director must be skillful and must keep in close touch with workers; (6) supervisors must make each worker conscious of his obligation to his fellow workers; (7) a study of individual habits and dispositions is important in keeping accidents under control; and (8) "repeat" accidents can be reduced by finding out the facts, working with the individual involved and then publicizing the facts.

One big need in analyzing the accident experience of a company and of the industry as a whole is a standard procedure for reporting and evaluating lost-time accidents, Mr. Foster contended. Citing records kept by his own company, he stated that there is no evidence that fatigue is a factor in causing accidents.

Industry Seeks Young Men

Although colleges and universities in 1948-49 have the biggest enrollments in history, fewer students are studying mining engineering, reported Henry C. Woods, chairman of the board, Sahara Coal Co., Chicago, Ill. Mr. Woods urged the industry to take the following steps to attract young men to coal mining:

1. Help in revision of high-school and college textbooks, many of which contain information about coal that dates back to 1890.

2. Spur public information activities to enlighten the public about coal through the press, public speakers, radio and other mass-educational channels.

3. Get the industry's own house in order by improving living conditions and educational opportunities, building churches and meeting halls and providing better medical and hospital care; in other words, make mining communities attractive places to live in.

4. Develop unity of purpose among operators.

5. Seek out promising youngsters at the high-school level and, if they go to college later, follow through by maintaining contact.

6. Bring teachers and school officials up to date on the industry.

7. Make improvements in mining methods known to high school and college boys and tell them about the industry's need for trained men.

8. Work out cooperative plans for scholarships, special courses, research and extension work with colleges and universities.

9. Urge and help local high schools to set up vocational training courses in coal mining to rouse the interest of youngsters and give them the training they will need for mechanized mining.

10. Seek opportunities to make speeches before high-school audiences, groups of teachers and school officials and local citizens.

11. Visit mining-engineering students on the campuses of colleges and universities and tell them about the opportunities in coal.

12. Offer summer employment in the mines to college men to keep their interest alive and to speed their certification as foremen.

Visits to Colleges Urged

Commenting on Mr. Woods' address, Dr. C. E. Lawall, vice president, Chesapeake & Ohio Ry Co., warned that "The progressiveness of an industry can be measured by its attitude toward its young men." The coal industry, he pointed out, has brought in science and technology to secure its future and thereby has increased its need for skilled men who will sustain its advances and make further progress. He urged that the coal industry send representatives to college campuses to stress the industry's needs for technically trained men and the opportunities in coal mining. The industry must take the initiative in carrying its story to young men, he concluded.

Coal has much to gain from high-school graduates who cannot go on to college and from college-trained men as well, declared D. C. Jones, Pennsylvania State College, State College, Pa., who followed Dr. Lawall in a discussion of Mr. Woods' address. With the use of machines growing steadily in coal mining, the time is not far off when the mine foreman will be the dividing line between high-school and college-trained men, Mr. Jones said. To provide trained men for the lower supervisory levels, individual mining companies should help high schools set up courses, hire teachers and provide textbooks for students who expect to go into coal mining. In addition, an industry-wide agency, possibly Bituminous Coal Institute, should enlarge and standardize this program. Such an agency also could supplement the work of individual companies in publicizing the opportunities for college men who enter the industry, Mr. Jones added.

Scholarships have proved their merit in attracting young men to coal, Mr. Jones pointed out, but it might be better if these scholarships were offered on an industry-wide basis rather than on a company basis. In addition, there are some dangers in subsidizing engineers. The entire scholarship program possibly would profit by re-examination, he concluded.

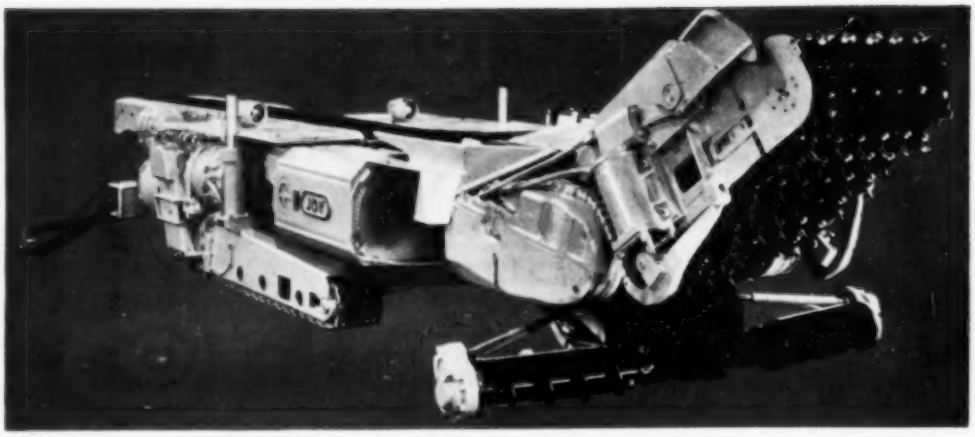
The concluding feature of the Thursday morning session was a three-man panel on management-employee relations, the speakers being R. L. Ireland Jr., president, The Hanna Coal Co., Cleveland, Ohio; S. M. Cassidy, president, Consolidation Coal Co. (Ky.), Jenkins, Ky.; and L. Ebersole Gaines, president, The New River Co., Mt. Hope, W. Va.

Improving Labor Relations

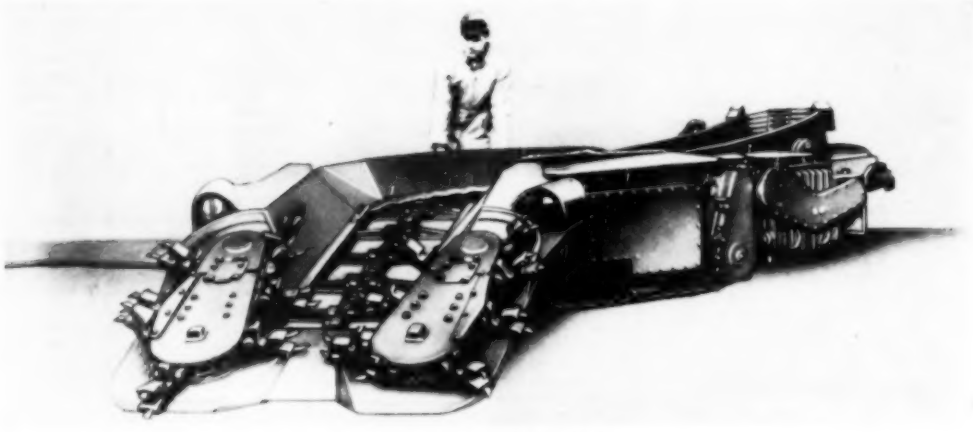
"Fair dealing is the basis of good human relations," Mr. Ireland pointed out. In addition to this, he said, management must master the art of teaching everyone in the organization to be proud of his job, proud of himself and proud of his company and his industry. Unless job pride is created, management cannot realize the full potential of modern mining machinery.

Company magazines and papers keep workers informed about what goes on in their company and give recognition for achievements by men and crews, said Mr. Cassidy. He listed several elements that help make a company magazine successful, as follows: good paper stock; good illustrations, with text kept at a minimum; lots of names and faces without, however, many pictures and names of high officials; varied subject matter, written briefly and to the point; frequent cartoons; stress on company and local affairs unless, in an isolated community, the magazine must double in brass as a newspaper; and emphasis on the personal element. The magazine should be circulated among other citizens in the community and should be sent to customers, schools, state and federal agencies as well as to employees, Mr. Cassidy added.

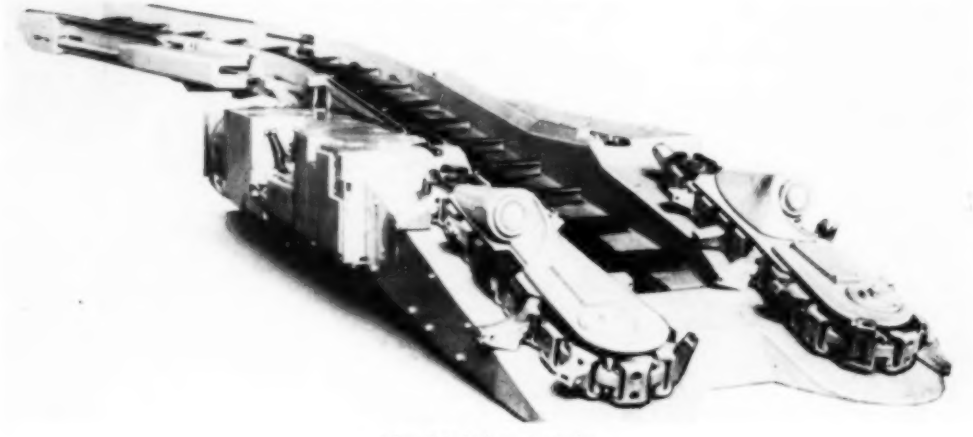
The size of a company has no bearing on the success or failure of its employee relations, Mr. Gaines declared. The controlling element is human nature. On the whole, the industry's labor relations on the local level are good and its public reputation for unsettled labor relations is a reflection of poor publicity rather than of real conditions. Mr. Gaines urged coal companies to undertake four steps to keep labor relations good and to revise public opinion of the industry: (1) promote job pride; (2) give recognition for achievement not only with a private pat on the back but also by publicizing the achievement; (3) publicize forward steps providing better living and working conditions; and (4) advance more than halfway to meet employees on good terms.



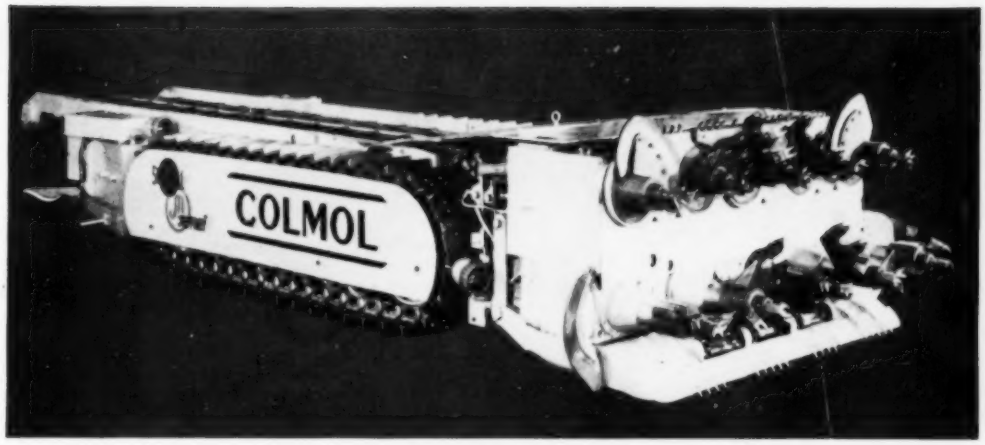
Joy continuous miner with clean-up gear



Goodman Type 660 tractor-treader loader



Jeffrey 36-in-high crawler loader



Sunnyhill-Jeffrey Colmol

Equipment Show Hits New High

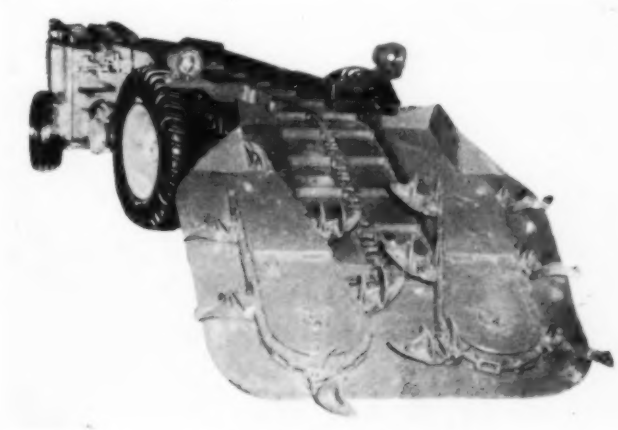
Acme Machinery Co., Williamson, W. Va.—Five sizes of LeRoi mine stopers, including one only 23 in long overall designed for drilling vertical holes in extremely close quarters.

Austin Powder Co., Cleveland, Ohio —CoalMaster augers, drill bits and tools, including new large-sized coal auger.

Bowdil Co., Canton, Ohio—9-ft 10RU bar with Bowdil chains and bits, Cincinnati drill equipped for Bowdil auger and Bowdil throwaway bits, rope rocket and picks with inserted points.

Bucyrus-Erie Co., South Milwaukee, Wis.—Photographic display of large stripping excavators at work, including Models 1050-B, 1150-B, 550-B and the recently introduced Model 450-W walking dragline (*Coal Age*, July, 1948, p. 166).

Carbit, Inc., Pittsburgh, Pa.—Carbide cutting and drilling equipment for deep and strip mines, carbide lathe tools and regular and sectional-type augers and accessories, including the Binegative cutter bit and new insert-type bits for use in present drill heads. The design of the new Binegative bit, according to the company, results in a cleaving action that eliminates chipping and breaking of the tip.



Clarkson Red Bird rubber-tired loader

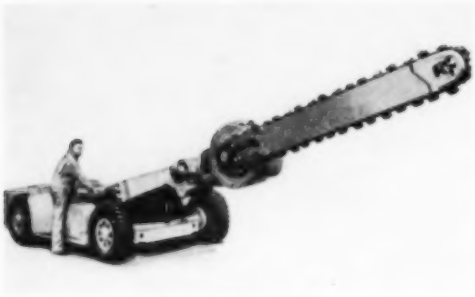
The new insert-type strip bits are available in two types—finger and broad-face. The latter, offered for extremely hard cutting, includes a heel which prevents head wear and is designed for greater strength and resistance to breakage.

Cardox Corp., Chicago — Cardox coal-dislodging systems, Cardox-Hardsocg horizontal and vertical drills, Cardox-Hardsocg continuous rotary cutter with augers ranging from 20 to 48 in in diameter for mining coal direct, drilling equipment for surface and underground drilling, complete Airdox unit, a full range of tungsten-carbide-tipped cutter heads and a new self-propelled horizontal drill.

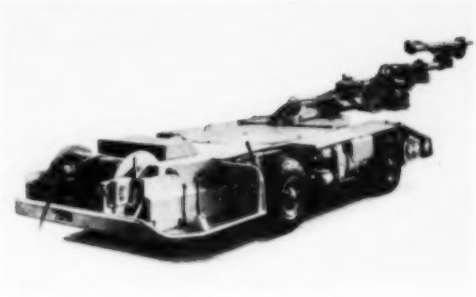
Caterpillar Tractor Co., Peoria, Ill. —D7 track-type tractor equipped with bulldozer and, rear, Hyster Hystaway carrying a ½-yd Esco dragine bucket; D6 track-type tractor equipped with a T6 Traxcavator featuring a new 3½-yd materials-handling bucket and, rear, a Hyster Hi-Speed winch.

Chicago Pneumatic Tool Co., New York—New one-man rubber-tired permissible single-arm TDS-7 Tramdrill (*Coal Age*, March, 1949, p. 172), DA-7 drill arm for mounting on customer's unit, 574 permissible post-mounted drill featuring a new self-releasing "deadman" control, 571 and 572 standard hand-held drills, the 572 high-speed (1,000-rpm) hand-held drill newly developed for use with tungsten-carbide-insert bits, C-P jack-hammers, 965 air-operated impact wrench and 327-R450 air-operated shop drill that also can be used for coal drilling.

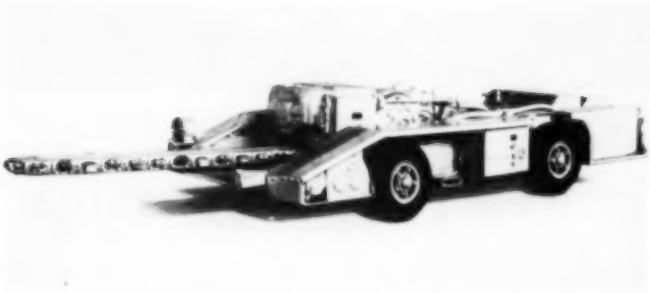
Cincinnati Mine Machinery Co.,



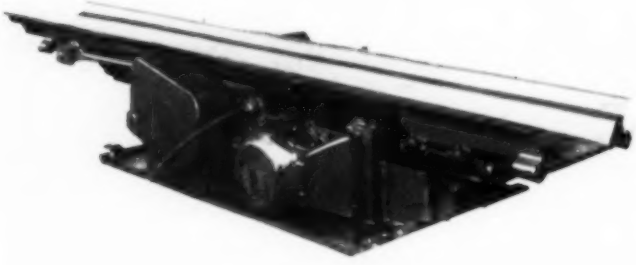
Jeffrey 70-UR rubber-tired cutter



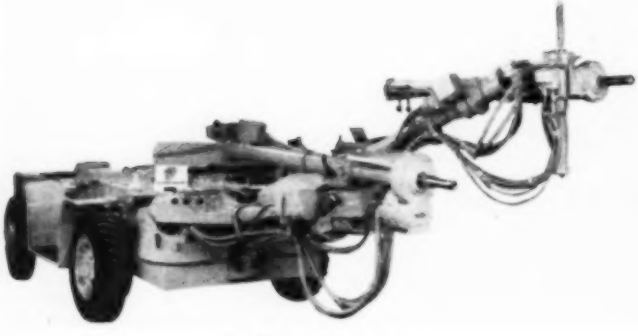
Jeffrey 56-FHR drilling machine



Jeffrey self-propelling rubber-tired shortwall truck



Goodman L-20 shaker drive



Joy CD-26 mobile coal drill

Cincinnati, Ohio—Complete line of chains for all types of cutting machines, Duplex and Stanex bits and Cincinnati cutter bars, including a cutter bar and hanger combination with adapter interchangeable on 7AU, 10RU, 11RU and 29U cutters.

Clarkson Mfg. Co., Nashville, Ill.—New Clarkson Type 28FA "Redbird" rubber-tired loader with 20-hp motor and new Uni-Flight conveyor chain featuring drop-forged flights.

Crichton Co., Equipment Division, Johnstown, Pa.—New Crichton all-mechanical hand-held coal-and-rock drill for one-man operation powered by a flexible shaft connected to a cutting machine operating at any speed; examples of the flexible-shaft drive as applied to face pumps, face rock dusters, timber saws, supply hoists and other face equipment.

Dooley Bros., Peoria, Ill.—Track-mounted and rubber-tire-mounted cable-reel drill trucks equipped with double-arm drills (*Coal Age*, June, 1948, p. 226) and Model 574 post-mounted drill.

Electric Steel Foundry Co., Portland, Ore.—ESCO coal-loading dipper, ESCO standard dragline bucket, all-cast manganese arch for 15-yd dragline bucket, chains, ESCO box-type teeth and adapters, and miscellaneous stripping items.

Firth Sterling Steel & Carbide Co., McKeesport, Pa.—Firthite tungsten-carbide mining tools, and augers and

Carbit Sinegative cutter bit

Goodman 812 EJ shortwall

accessories with adapters (*Coal Age*, November, 1948, p. 168), featuring a redesigned heavy-duty cutter bit, light-duty heavy-tip cutter bit and a new bit for Bowdil chains with wedge-shaped top gaging surface designed to prevent wobble.

The redesigned heavy-duty bit features a curved heel for higher efficiency and lowered power consumption, as well as a special carbide for mining service stated to be much tougher and therefore less likely to chip or break. The light-duty bit is made with a thicker tip, said to lengthen the life and reduce tip breakage. Differential heat treatment of bits also was stressed by Firth Sterling, which pointed out that the result was a hard tip end plus a tough less-breakable shank.

Goodman Mfg. Co., Chicago—Mining and allied equipment, including 512 and 712 shortwalls with bugdusters, 460 track loader, carbide-tipped bits, throwaway bits and holders, shaker drives and troughing, and new items as follows: 660 tractor-tread loader, L-20 shaker drive, 812EJ shortwall, aluminum column-type troughing providing a substantial weight saving for easier moving, and the Type 69 pin-type cutter chain, said to materially speed the replacement of blocks.

With a rated capacity of 10 tons per minute, the new 660 loader has an over-all height of 31 in and can be built with a coal-line height of 21 in. The loading head can be raised 31 in, and both the head and rear conveyor can be swung 40 deg each side of the center line. The coal is carried back to the transportation unit by a continuous single-strand chain, to which the flights are connected by double-acting swivels. The machine is powered by two 35-hp motors and all motions are hydraulically controlled.

Designed for low coal, the L-20 shaker drive is offered as a high-capacity one-piece unit "with the ultimate in shaker motions." Powered by a 20-hp motor and designed as an underneath unit, the drive is said to eliminate the need for side-driving equipment in thin seams. The drive trough is nested in the drive, resulting in an over-all height of only 24 in. The unit can be adjusted for 6½- or 9-in strokes and for 70 or 77 strokes per minute. The coal-line height of 16 to 23 in is said to be ideal for discharge onto belts. A big skid and increased bearing area make the drive easier to hold.

The 812EJ shortwall, powered by a 50-hp motor, includes a built-in bug-duster and features hydraulic control of both drums and tilt, with automatic acceleration in the electrical control. Height of the unit is 19 in and it will accommodate bars up to 11 ft in length. Cutting feeds are 20, 28, 32 or 39 in per minute.

Harnischfeger Corp., Milwaukee, Wis. — Electric and diesel-electric shovels, including the new Model 1400 4-yd shovel featuring Magnetorque hoist drive.

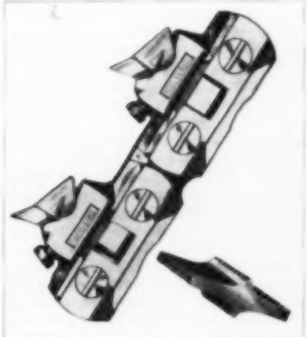
Hendrix Mfg. Co., Inc., Mansfield, La.—Dragline bucket from the company's line of units up to 32 to 35 yd.

Frank G. Hough Co., Libertyville, Ill.—Model HM Payloader with four-wheel drive, power steer and 1½-yd loading bucket, stated to be quickly convertible to a bulldozer or crane. (*Coal Age*, January, 1949, p. 154). The unit has a 10-ft lifting height and an 8-ft dumping clearance. It is mounted on rubber tires for speedier operation.

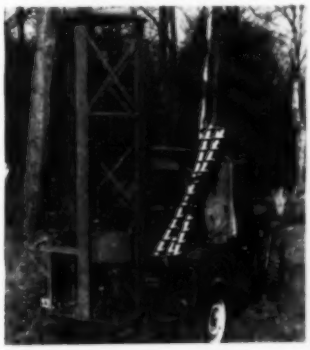
International Harvester Co., Chicago—TD-18 tractor with Bucyrus-Erie bulldozer, 80½ drawbar horsepower.

Jeffery Mfg. Co., Columbus, Ohio —Colmol continuous mining machine with new top-scarifying device, mine and slope conveying equipment, 61-CLR rubber-tired conveyor-loader with a height of 24 in and a rated capacity of 1½ tons per minute and the following new units: 73-A and 73-B crawler-mounted loaders, 35-B and 35-L high- and low-type shortwalls with built-in slack-handling devices, Type 70-URA and URB universal cutters, rubber-tired truck with hydraulic drive accommodating any type of shortwall cutter, and the Type 56FHR rubber-tired drill providing hydraulic operation and a drilling range as follows: 13 ft 1¾ in either side of the center line and 6 ft 11¼ in above the floor.

Also featuring hydraulic drive and rubber-tire mounting, the new 70-UR universal cutter was stated to have a range as follows: maximum height, top cutting, 7 ft 3 in above the floor; maximum width, with 9-ft bar, 30 ft; maximum shearing distance, 5 ft 6 in each side of the center line. Minimum over-all height of the URA model is 30 in; URB, 34½ in. Cutting is done with a 50-hp motor, with a second 25-hp motor driving two hydraulic pumps powering all other motions, including two-speed tramming and steering. Minimum tramming length, with bar over machine, is 22 ft 1 in.

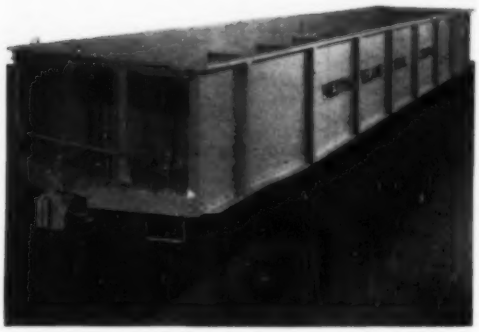


Precision chain and Rockbuster Multiplex bit



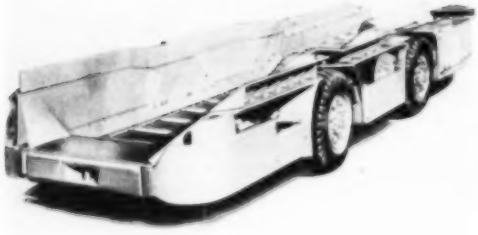
Mobile Drilling Co. jeep-mounted drill

Reich prospecting drill



ACF 30-ton mine car

G.E. 25-ton haulage locomotive



Jeffrey 35-in-high shuttle car

Joy 6-SC shuttle car

Specifications for the new 73-A and 73-B loaders are: length, 29½ ft; width, 6 ft 10½ in; height, 73-A, 28 in; 73-B, 36 in; maximum and minimum discharge heights, 73-A, 41½ and 19½ in; 73-B 51½ and 29½ in; weight, 26,000 lb; speed, feeding into the coal, 50 fpm; maximum swing of discharge boom, 45 deg each side; vertical movement of gathering head, 30 in; maximum capacity in loose coal, 10 tons per minute. The machines are equipped with two electric motors driving three hydraulic pumps each, which in turn power all operations.

Joy Mfg. Co., Pittsburgh, Pa.—Standard loaders, cutters, shuttle cars, coal drills, Silver Steak cadmium-plated rock drills, shaker-conveyor equipment, 7-B high-capacity and 11-B conveyor-mining shortwalls with built-in bugdusters, Sulmet tungsten-carbide cutter and drill bits and the following new units: 3-JCM continuous miner with new spiral clean-up attachment, Model CD-26 two-boom hydraulic coal drill with built-in hydraulic roof-bolting auger, US-12½ low-height shaker-conveyor drive featuring straight-line motion and a capacity of 25 to 35 tons per minute, Joy safety-coal drill (a hand-held unit with completely enclosed boring bar and no exposed moving parts), 7-B hydraulically controlled shortwall with built-in bugduster, hydraulic tilt, etc. (a 50-hp machine accommodating bars up to 11 ft or more), and the Model AD-1 coal borer for underground mining by the boring method. The latter is designed to take augers up to 42 in in diameter.

The new CD-26 drill is equipped with a 26-hp motor providing power for all hydraulic operations. Height is 36 in; width, 82 in; weight, 11,700 lb; tramming speed 0 to 230 fpm; maximum hole diameter, 4½ in; depth 9 ft; maximum drilling height, 10-ft boom, 9 ft; 7-ft boom, 7 ft; maximum horizontal drilling with 10-ft boom, 21 ft 10 in; 7-ft boom, 15 ft 11 in.

Kennametal, Inc., Latrobe, Pa.—Mining-machine bits, auger bits, finger bits and solid-head bits for strip mining; rock bits for drilling medium and hard ground and a new hitch-cutting core-drill head 9¼-in in diameter.

R. G. LeTourneau, Inc., Peoria, Ill.—Improved Model Super C Tournadozer, a 4-wheel rubber-tired high-speed tractor-dozer featuring new electric control of dozer blade and increased top speed of 19 mph; LeTourneau constant-mesh clutch permitting changing gears without changing speed; gearbox for the Tournatorque electric motor controlling steering and hopper gates on LeTourneau units.

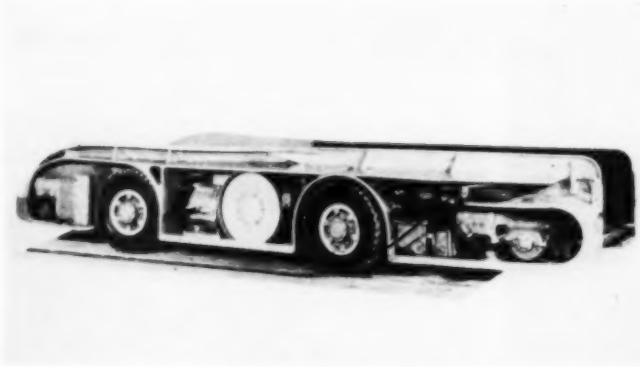
LeRoi Co., Cleveland Div., Cleveland, Ohio—Cleveland MDR 240 mine jumbo with DR 34 6-in-feed drifters, line oilers, Cleveland S 11 S stopers for pin timbering, 85 to 100 lb weight, 40-, 34-, 28-, 22- and 16-in feeds, 1- to 1¼-in holes, other rock drills and the new 18-lb H 22 jackhammer.

Lima-Hamilton Corp., Lima Shovel and Crane Div., Lima, Ohio—Type 1201 stripping shovel and other Lima shovels, draglines and cranes.

Link-Belt Speeder Corp., Cedar Rapids, Iowa—Shovels, draglines and cranes for stripping and coal mining.

Marion Power Shovel Co., Marion, Ohio—Marion shovels and draglines.

Mobile Drilling, Inc., Indianapolis, Ind.—New jeep-mounted mobile prospecting drill designed for drilling holes approximately 6 in in diameter but adaptable to use with larger augers. The unit operates in either horizontal or vertical positions, re-



Goodman cable-reel shuttle car

quires only one man and can be mounted on a truck or tractor, according to the company.

Mosebach Electric & Supply Co., Pittsburgh, Pa.—Bacharach-Strauss carbide drill bits.

Myers-Whaley Co., Inc., Knoxville, Tenn.—Whaley Automat loading machine.

Northwest Engineering Co., Chicago—Shovels, cranes and draglines.

Oliver Corp., Industrial Div., Cleveland, Ohio—Model FDE Oliver-Cletrac tractor equipped with new Heil cable-operated bulldozer, DDH Oliver-Cletrac with new Drott Hi-Lift loader, HG Cletrac with Imp dozer, wheel tractors and miscellaneous materials-handling equipment.

Page-Engineering Co., Chicago—Page 3-cu yd automatic-digging dragline bucket featuring armored-steel construction.

Paris Mfg. Co., Paris, Ill.—New Parmanco one-man self-propelled vertical coal drill, gasoline-powered and featuring hydraulic feed (*Coal Age*, February, 1949, p. 184) and the new Parmanco rubber-tired horizontal drill, with a completely redesigned power plant developing 37 to 40 hp at 2,400 to 3,200 rpm and equipped with self-starter. Feed has two speeds forward and two reverse through a separate power take-off and the new-style Parmanco chuck is standard equipment. The unit has dual front wheels and secures complete traction by a telescoping shaft to a truck-type rear axle having mechanical brakes. Also displayed was the Parmanco two-speed vertical drill with A-frame and speed hoist.

Precision Chain Co., Terre Haute, Ind.—Precision chains with the new Rockbuster - Multiplex and Rockbuster-Diamond bits (*Coal Age*, January, 1949, p. 156). The Multiplex bit is described as a super-heavy double-use bit of alloy steel of almost high-speed hardness. Each bit has side blades that overlap across the cutting tracks, shielding chain links and bit holders against coring damage. Drop-forged adapter clips, the company states, make the Diamond bit usable in practically all types of cutter chains employing the conventional screw holders. The screw bites the front end of the clip and freezes the back edge of the bit solidly against the socket wall. The bit leans slightly backward, thus, it is declared, making possible faster and more-efficient cutting with less power and maintenance.

Frank Prox Co., Inc., Terre Haute, Ind.—Cutterbars and drive sprockets for all types of cutting machines, Prox drop-forged tool-steel and standard bits, and the new Prox Duomatic cutter chain designed for various makes of machines, featuring no bulky heads overhanging the cutterbar. The chain is furnished in eight or ten positions for three types of bits, and features hardened-alloy pins and bushings, machined interlocks and precision heat treatment. It is so designed, according to the company, that breakdown normally can be quickly repaired at the face. New Prox Duo bit for use with Duomatic chain is made from alloy steel and is held in place by only one moving member, permitting rapid changing, the company states.

Reich Bros. Mfg. Co., Terre Haute, Ind.—New line of hydraulic rotary prospecting drills. Designed for truck mounting, the booms are lowered to the bed of truck to make a compact unit for road travel. Two hydraulic motors in the boom head power the drill and the unit provides a full 10-ft stroke. The boom is raised and lowered hydraulically.

Salem Tool Co., Salem, Ohio—McCarthy vertical drills for 6- to 8-in holes in overburden 30 to 100 ft deep, self-propelled horizontal drills for 6- to 12-in holes in overburden 20 to 120 ft, McCarthy boring machine for rock drilling and the new McCarthy coal drill with augers 16, 20 and 30 in in diameter for recovery of coal after stripping (*Coal Age*, December, 1948, p. 76).

Sterling Steel Casting Co., East St. Louis, Ill.—Seals for stub axles, featuring a new permanent locking device for adjustment of Timken roller bearings in seals. Sterling cast-steel balanced-design mine-car wheels, and steel castings for mining service.

Timken Roller Bearing Co., Canton, Ohio—Timken detachable rock bits and carbide-insert rock bits for all types of mining.

Track and Trackless Haulage

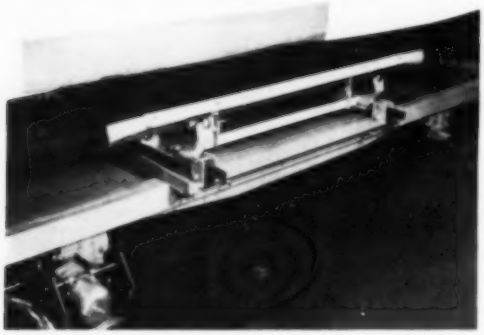
American Car & Foundry Co., New York—ACF mine cars, including a 43-ft 8-wheel automatic drop-bottom unit, one of 50 being built for the Westmoreland Coal Co. The car is 6 ft high, 7 ft 8½ in wide, and has a track gage of 44 in. It is equipped with automatic couplers, a new-type draft gear, roller side bearings on trucks, ACF-design 4-wheel bolster-type trucks with 18-in-diameter steel wheels with tapered roller bearings and hand-operated brake on rear truck.

American Mine Door Co., Canton, Ohio—Newly improved 1-ton-per-minute track cleaner featuring chain-conveyor take-up and improved telescopic hitch for more even loading of car; automatic switch thrower.

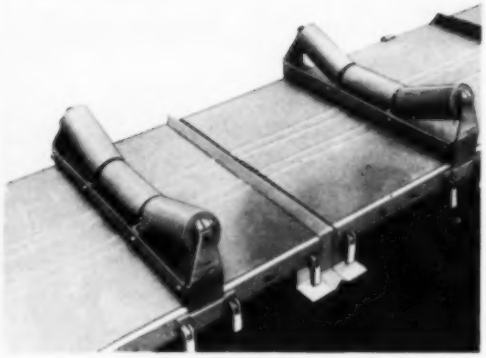
Barber-Greene Co., Aurora, Ill.—B-G standard truss-frame three-roll troughing-carrier belt conveyor and two new underground belt conveyors employing special channel or angle frames and low-backed carriers specially designed for low coal. Available in two different lengths, sections are readily detachable for moving and feature offset center rollers for saving height. Other conveyor equipment and the application of B-G materials-handling units also was featured.

Bethlehem Steel Co., Bethlehem, Pa.—Truck for 10-ton 8-wheel mine car; new combination switch stand with reflector target (*Coal Age*, March, 1949, p. 166); prefabricated mine track designed for individual installation; and sections of various steel mine ties, including new bolted or riveted frog ties usable for either left- or right-hand turnouts. The frog ties are now part of Bethlehem tie sets for turnouts and through positive locking action support the frog and maintain track gage.

Brown-Fayro Co., Johnstown, Pa.—New Model HKR car-spotting hoist rated at 18,000-lb rope pull at 35 fpm and featuring 25-hp motor, Model B.C. automatic brake, triple-reduction gearing, spiral-bevel clutch and snubber brake on rope drum; Model HGD rigging hoist; 4-axle-type steel mine car with water-level capacity of 92 cu ft; chilled cast-iron Timkin-bearing mine-car in operation 2,834 days for a distance of over 40,000 miles; patented rubber-cushioned journal tube for through-axle-type mine cars; rerailers and derailers.



Joy floating belt-loading station



Iowa Mfg. Co. underground conveyor

Penn-Morgantown truck body

Mining Machine Parts Biggie rail guard

Carnegie-Illinois Steel Corp., Pittsburgh, Pa.—Mine track and cars.

Caterpillar Tractor Co., Peoria, Ill.—D8 track-type diesel tractor powered by a D1300 engine pulling a No. 80 scraper with a capacity of 13.5 yd struck and 18 yd heaped; DW 10 rubber-tired 115-hp tractor pulling a new Athey PD10Q Wagon with a heaped capacity of 10 yd.

Cheatham Electric Switching Device Co., Louisville, Ky.—Electrically operated track switches and derails.

Differential Steel Car Co., Findlay, Ohio—Large capacity all-steel mine car equipped with new combination and coupler and spring-draft gear designed with about half the usual number of parts and swiveled to permit dumping cars without uncoupling, new-type forged-steel mine-car wheel with demountable rim, which can be replaced when worn for a considerable saving over purchase of new wheels.

Enterprise Wheel & Car Corp., Bristol, Va.-Tenn.—Two 4-axle mine cars, one an all-steel car of the lift-endgate type with double-acting spring bumpers; the other a rotary-dump flat-bottom unit having a spring drawhead and bumper with rubber pad.

Euclid Road Machinery Co., Cleveland, Ohio—Euclid TDT 40-ton bottom-dump coal-hauler powered by 275-hp diesel engine for a 32-mph top speed; new Model FFD 34-ton tandem-axle rear-dump Euclid powered by two 190-hp diesel engines mounted side by side and each driving one of the rear axles through a torque converter and torqmatic transmission, thus eliminating the conventional inter-axle power divider. There is no clutch pedal or manual shifting of gears. Top speed is 25.4 mph. Also displayed was the planetary drive axle featured on Euclid trucks.

Flood City Brass & Electric Co., Johnstown, Pa.—Junior car spotter.

General Electric Co., Schenectady, N. Y.—One of 11 25-ton high-speed locomotives being built for the Tennessee Coal, Iron & R. R. Co. Actual weight is 30 tons and the rated speed of the new unit is 25 mph. Designed for long-distance high-tonnage hauls, the unit features dynamic braking, sealed-beam headlights, smooth operating control, equalized air brakes, two four-wheel swivel trucks and four 120-hp motors. Height is 54 in with the trolley poles down.

Goodman Mfg. Co., Chicago—91-H low-type 8-ton cable-reel locomotive with vertical-type wheel and new shuttle cars and belt conveyor. Each 35 in high and each with a normal capacity of 3 tons, the new 274 and 374 shuttle cars differ only in that the 274 has a two-wheel drive, against four for the 374. Loaded speed is 3 mph; empty, 4 mph. The minimum turning radius is 17½ ft. Features include four-wheel brakes, mechanical steering with hydraulic booster, 40-in-width flat-running reversible conveyor chain, automatic cable reel and practical drive mechanism.

The new 99-5-GT-36 36-in-width belt conveyor for shuttle-car and other service includes a special section for installation at the end or in the belt line for taking coal from shuttle cars. It is easily extended, located and moved, according to the company, and special construction transfers all loads on the sections directly to the ground. The conveyor was accompanied by a new Goodman roller switch to prevent damage in case of belt breakage and a special hold-in button to double belt speed during the period of shuttle-car discharge.

Hockensmith Corp., Penn Body Div., Penn, Pa.—Mine-car parts, track rollers and sheaves, and the new Penn-Morgantown low-mount semi-trailer dump body with Penn telescopic 713 twin inboard-mount hoist for use on any dump-type chassis. Length of the body is 16 ft, width 84 to 94 in, sides 32 in. Rated capacity is 15 cu yd.

International Harvester Co., Chicago—New 182-in-wheelbase off-highway truck-tractor with Hall-Scott HS-400 diesel engine. Capacity of this W-4042-OH model is 25 tons, with a gross vehicle weight of 40,000 lb. Full-load speed was stated to be approximately 50 mph, level road. International Harvester also displayed the new KB-11F 16-yd dump-body truck for coal hauling. With a 450-cu in gasoline engine and tandem drive, the unit will do about 48 mph with full load on a level highway.

Interstate Equipment Division, Yara Engineering Corp., Elizabeth,

Euclid Model FFD 34-ton truck

Mack LR tractor with Heil trailer

N. J.—Aerial-tramways, including heavy-duty mine-refuse units.

Iowa Mfg. Co., Cedar Rapids, Iowa—Completely new underground mine conveyor, featuring boltless assembly, with all parts locked rigidly together with off-center cams.

Irwin Foundry & Mine Car Co., Irwin, Pa.—8-wheel-mine-car track and belt-conveyor idler set.

Jeffrey Mfg. Co., Columbus, Ohio—Dynamic braking system for retarding speed of locomotives on long down grades, belt conveyors and new shuttle cars and elevating conveyors.

With basic heights of 30, 35 and 43 in, the new Class 65 cable-reel cars are furnished in capacities of 3.20 to 4.75 tons without sideboards and with average topping. With sideboards, capacities run from 4.22 to 7.75 tons. Features include 7½-or 10-hp traction motors, hydraulic steering, hydraulic brakes with booster and hydraulic chain drive. All three sizes can be furnished with either two- or four-wheel drive and steer. Discharges can be furnished either in fixed height or with a hydraulic raising and lowering device. The elevating discharge is standard on the 43-in car, with capacities as follows: basic height, 4.75 tons; 6-in sideboards, 6.25 tons; 12-in sideboards, 7.75 tons. The elevating discharge also is standard on the low-type cars, with capacities as follows: 35-in basic height, 3.75 tons; 6-in sideboards, 4.80 tons; 30-in basic height, 3.20 tons; with 6-in sideboards, 4.22 tons, all with average topping.

The new 72-AR elevating conveyor can be furnished with rubber tires, flanged wheels or implement-type wheels. It is powered by a 10-hp motor. Surge capacity is 2.5 tons without sideboards and 4.5 tons with sideboards. Weights are 7,300 lb without sideboards and 8,000 lb with.

Joy Mfg. Co., Pittsburgh, Pa.—Joy No. 3 60-hp drive belt with fluid coupling, Joy Model MTB-30 30-in belt conveyor featuring new floating belt-loading station and the new 6-SC and 10-SC shuttle cars.

The floating belt-loading station, the company declares, permits more efficient loading from the side with shuttle cars, since the unit follows the float of the belt and stays directly over it at all times. The belt display also included the Alterlock, which permits interlocking with all other conveyors, and a pull-cord switch to permit the belt to be stopped from any point in an emergency.

With a height of 29 in, the new 6-SC car was stated to be the lowest shuttle car now being offered. Capacity is 2½ to 3 tons. Features include four-wheel drive and steer with four positive driving wheels, plus hydraulic steering. The car is powered by two 7½-hp traction motors, with a third 7½-hp motor operating the conveyor.

Also featuring four-wheel drive and steer, with no-slip differential, the 10-SC car has a basic height of 54 in and a capacity of 8 tons, with a load rating of 12 tons. It is available in over-all widths of either 96 or 88 in, with two 10-hp traction motors and two 5-hp conveyor motors.

Koppers Co., Inc., Pittsburgh, Pa.—Standard Ar-Moored ties and Ar-Moored frog ties.

R. G. LeTourneau, Inc., Peoria, Ill.—New Model E-50 50-ton bottom-dump Tournahopper, a high-speed rubber-tired self-propelled coal hauler capable of dumping 50 tons of coal in 35 sec and having a capacity of 67 cu yd of dirt; newly introduced E-16 rubber-tired reardump Tournarocker with a capacity of 10 tons of coal and 16.8 cu yd of dirt without side plates and 16 tons of coal and 21 yd of dirt with side plates (*Coal Age*, November, 1948, p. 166).

Link-Belt Co., Chicago—Car dumpers, slope belts and other haulage equipment.

Long Super Mine Car Co., Inc., Fayetteville, W. Va.—Two models of the 400 Series Long chain conveyors, featuring "Gravity-Takeup" headpiece for take-up of chain, Superflite conveyor chain, "Whispering Joint" alloy-steel conveyor pans, and new one-piece cast-manganese-steel tailpiece frame designed for longer service and heavier loads.

Mack Trucks, Inc., New York—Recently introduced Model LRSW 30-ton six-wheel heavy-duty truck; new Model LR tractor equipped with 32- to 35-ton Heil bottom-dump coal trailer. Low height and wide hopper speed loading of trailer, with air-operated dump doors assuring rapid clean dumping. Also displayed were Mack power divider; TRDX 51 transmission, said to be the largest in production; Mack SW 43 4-wheel-driven truck bogie.

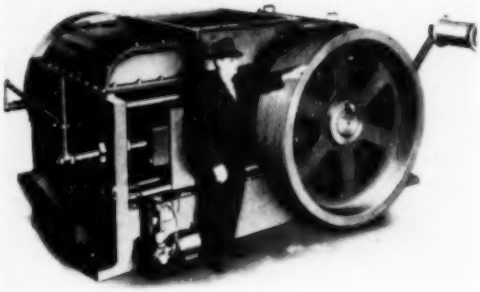
Miners Hardware Supply, Pittsburgh, Pa.—Transition rails, compromise bars, skids, switch signals and other track equipment.

Mining Machine Parts, Inc., Cleveland, Ohio.—New "Biggie" one-piece alloy-steel guard rail combining splice bar and rerailer that can be attached or removed in 30 sec without punching, drilling or use of special tools. It reportedly eliminates bolts, spacers and other obstructions, thus reducing wheel breakage, and also eliminates handling many loose parts.

Nachod & United States Signal Co., Louisville, Ky.—Automatic block signals, mine-haulage equipment, highway-crossing signals, trolley contactors, signal lights and other signal equipment, including manually operated momentary-contact switches, switch and derail indicators, control panels, circuit controllers, reflex trip markers, etc., plus a new three-light block signal, Model C2949AL, with normal-burning yellow light instead of a dark signal to show a clear block. It is stated by the company to permit greater flexibility in installation.

National Malleable & Steel Castings Co., Cleveland, Ohio—New National M-225 rubber draft gear for large mine cars, part of the equipment of the new ACF 30-ton unit. The first of a new series for large cars, the M-225 features stronger construction and heavier load capacity in a smaller area, taking a 200,000-lb static load with 2¼-in travel. Also shown were a cable hitch for pulling and rerailing mine cars equipped with Willison

Deister Concentrator SuperSorters



Jeffrey heavy-duty double-roll crusher

couplers, adaptor for hitching Willison-coupled cars to link-and-pin-coupled cars, Willison automatic mine-car couplers and mine-car wheels.

Nolan Co., Bowerston, Ohio—Operating model of newly improved car feeder-retarder featuring a single chain trip that both feeds and retards cars. Dog position is controlled by utilization of a third track to permit dual function. Also shown were operating model of a rotary car dumper and rerailers.

Ohio Brass Co., Mansfield, Ohio—Jones & Laughlin automatic mine-car coupler equipped with air lines through the coupler faces.

Robins Conveyors Division, Hewitt-Robins, Inc., Passaic, N. J.—Robins mine conveyor, conveyor drives, idlers, belting and accessories.

Sanford-Day Iron Works, Inc., Knoxville, Tenn.—S-D Floater anti-friction wheels and the Norton Coal Corp. overlapping drop-bottom mine car with dust-sealed doors.

Truck Engineering Corp., Cleveland, Ohio — Model 4SFSW tandem-axle dump unit for highway operation, with a 20½-cu yd capacity for hauling 16 to 18 tons of coal.

Watt Car & Wheel Co., Barnesville, Ohio—Watt bolster-type truck for 8-wheel mine cars, all-steel 260-cu ft mine car equipped with four spring-suspended wheels and Ohio Brass couplers, one of 460 cars built for Mine No. 9, Old Ben Coal Corp.

Westinghouse Electric Corp., Pittsburgh, Pa.—Standard 15-ton 180-hp mine locomotive.

West Virginia Steel & Mfg. Co., Huntington, W. Va.—Prefabricated mine track, rerailers now standard on turnouts, rail and other products for coal mining.

Preparation and Utilization

Allis-Chalmers Mfg. Co., Milwaukee, Wis.—5x12-ft Ripl-Flow double-deck screen, 6x16-ft Low-Head screen with dewatering deck, 14x16-in solids-handling pump, to Low-Head vibrating mechanism and the new car shaker for emptying coal and other granular material from hopper cars, which is lowered by a hoist to the top flanges of the car and vibrates to loosen material (*Coal Age*, May, 1949, p. 172).

American Cyanamid Co., Mineral Dressing Division, New York—Heavy-Media separation and Dutch State Mines cyclone separator; other coal-preparation products.

American Air Filter Co., Louisville, Ky.—Type N and Type W Roto-Clones for dust collection and the new Type N wet-type Roto-Clone dust scrubber for dust control in tipples and dry preparation plants, dedusting, etc. The new wet-type unit, the company declares, has a much higher efficiency compared to mechanical units, thereby reducing air pollution. The figure for dust usually encountered in preparation-plant operation is over 99%. The unit is offered in a series with capacities of 1,500 to 44,000 cfm.

Bird Machine Co., South Walpole, Mass.—18x28-in Bird centrifugal filter for dewatering fine coal.

Bituminous Coal Research, Inc., Pittsburgh, Pa.—Manufacturers' models of smokeless residential-heating equipment designed by BCR, overfire jets for industrial smoke abatement and charts depicting various phases of BCR research.

Bixby-Zimmer Engineering Co., Galesburg, Ill.—Bee-Zee screen cloth, plus line of standard and recently developed screen for use in vibrators, shakers, stationary drag conveyors and centrifugal dryers.

Carnegie-Illinois Steel Corp., Pittsburgh, Pa.—USS 18-8 stainless-steel coal screens.

Centrifugal & Mechanical Industries, Inc., St. Louis, Mo.—C-M-I continuous centrifugal dryers.

Chesapeake & Ohio Ry. Co., Cleveland, Ohio—Operating model of the world's largest single-unit locomotive, a replica of the C. & O.'s "500"—the first coal-burning steam-turbine-electric locomotive ever built.

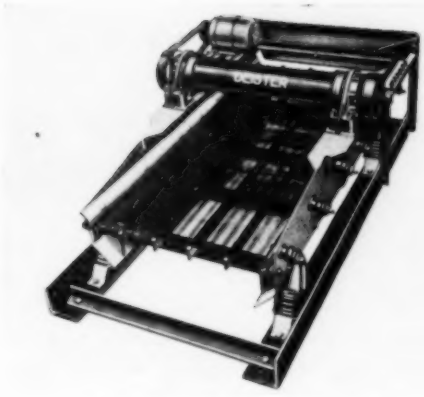
Colorado Fuel & Iron Corp., Wickwire-Spencer Steel Division, Denver, Colo.—Super-Tempered space cloth for grading coal and other materials.

Combustion Engineering-Superheater, Inc., Flash Dryer Division, Chicago—C-E Raymond flash-drying system for fine coal.

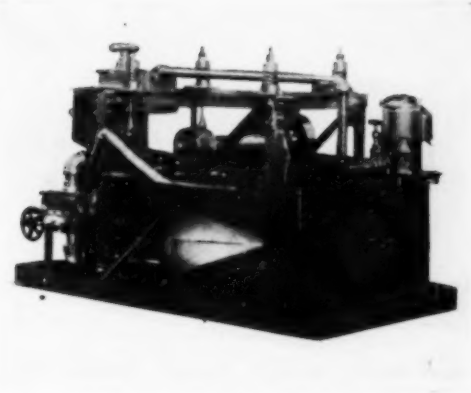
Nelson L. Davis Co., Chicago—Heavy-media coal preparation engineering and equipment, including packaged units in capacities up to 100 to 300 tph, shipped for erection ready to go.

Deister Concentrator Co., Ft. Wayne, Ind.—Improved latest-type SuperDuty Diagonal-Deck coal-washing table, Concenco Spray nozzles and the new eight-cell Concenco SuperSorter recently developed for hydraulic classification of large tonnages of coal. Feed rate of each of the four eight-cell units now in commercial use is 100 tph of ¼x0-in coal. The unit is said to be the first multiple-spigot hydraulic classifier capable of handling loads and volumes necessary and producing classified products of a dilution suitable for tabling. Concenco SuperSorters now are available in a range of sizes and water and power requirements are reportedly low. The eight-cell unit is 14 ft high, 6 ft wide and 40 ft long.

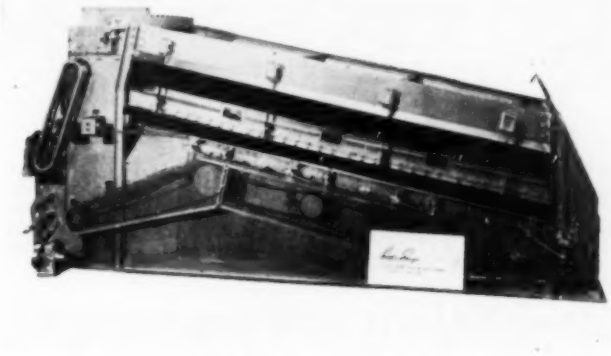
Deister Machine Co., Ft. Wayne, Ind.—Plat-O coal-washing tables and the new high-speed Type SL Plat-O vibrating screen offered especially for cleaning fines containing up to 9% moisture. Features cited by the company include counterflow motion up to ¼ in amplitude and up to 2,000 rpm, a steep slope and a graduated stroke to keep the bed thin and moving. As a result, clumps are broken up and good



Deister Machine Type SL vibrating screen



Roberts & Schaefer Froth Flotation Hydrotator



Roberts & Schaefer Super-Airflow cleaner

screening at high capacity is obtained, it is stated. The unit head motion can be quickly installed and removed.

Denver Equipment Co., Denver, Colo.—No. 8 Denver "Sub-A" flotation machine, preceded by a Denver super-agitator and conditioner in operation in a closed circuit. Designed for treatment of fines, the Denver "Sub-A" machine also can handle coarser particles and is effective in recovering solids in plant surry up to ¼-in. Special deep-digging punched-plate rakes and a wedge-bar compression screw conveyor increase dewatering efficiency, with return of surplus slurry water to unit reducing stream pollution.

Eriez Mfg. Co., Erie, Pa.—Large-diameter permanent non-electric magnetic pulley, giant non-electric plate-type magnet developed for installation in the bottom of feed chutes and a working model of the electronic metal detector for detection of non-ferrous metals.

Fairmont Machinery Co., Fairmont, W. Va.—Chance sand-flotation preparation of coal.

Galigher Co., Salt Lake City, Utah —Geary-Jennings automatic coal sampler, Galigher automatic chain-driven coal samplers for continuous and intermittent operation, and the redesigned two-cell Agitair flotation machine with hollow shafts for air admission, thus eliminating all outside pipes, increasing visibility and reducing maintenance through greater accessibility. Increased operating efficiency is another advantage, the company states.

Hendrick Mfg. Co., Carbondale, Pa. —Coal screens of all types and the new Hendrick power-operated testing screen with removable screen sections 18x18 and 22x22 in in size. The unit handles a 50-lb sample. Hendrick also featured perforation of material from 15/16-in steel down to 30-gage brass.

Heyl & Patterson, Inc., Pittsburgh, Pa.—New Cyclone thickener and new thermal dryer.

Humphreys Investment Co., Denver, Colo.—Humphreys spiral concentrators for fine coal, featuring improved feed and discharge boxes and new center take-off for refuse, eliminating about three-fifths of the launders previously required. The new feed box, it is said, gets concentration under way immediately.

Iowa Mfg. Co., Cedar Rapids, Iowa —Cedarapids 3033 hammer mill, with hammers and speed (450 rpm) specially adapted to produce high proportion of cube-shaped coal and little dust, package-type tipples for small-mine use and double-deck horizontal coal screen designed for high capacity on fine sizes.

Jeffrey Mfg. Co., Columbus, Ohio—Coal-preparation services and equipment, including Jeffrey-Traylor vibrating feeders and grizzlies, rotary air valves providing positive control over the differential stroke in jigging, and new heavy-duty double-roll crushers for breaking down everything coming from the face. Maximum feed size ranges from 48x36x24 to 30x29x18 in, depending upon crusher size. Product range, according to the company, is 4 to 12 in; capacities, 250 to 750 tph.

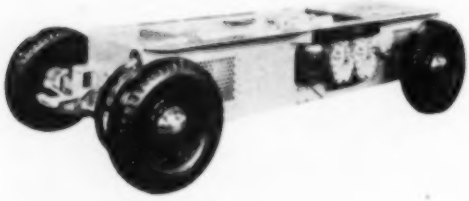
Link-Belt Co., Chicago—Heavy-media coal-cleaning and equipment and other preparation services and equipment, including the Multi-Louvre dryer and "CA" concentric-action vibrating screens.

McLanahan & Stone Corp., Hollidaysburg, Pa.—Rockmaster 24x36-in single-roll crusher for handling mine refuse or crushing coal.

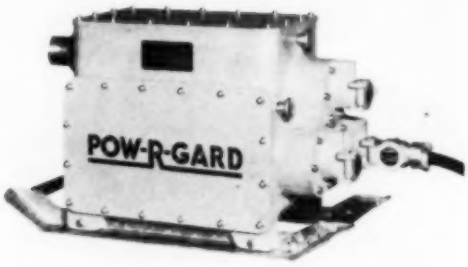
McNally-Pittsburg Mfg. Co., Pittsburg, Kan.—New 24x36-in McNally-Pittsburg Gearmatic stoker-coal crusher (*Coal Age*, October, 1948, p. 184), McNally-Pittsburg Bulldog-type car retarder, McNally-Norton Baum-type-jigfinger gate, Gearmatic breaker, Vissac dryer, Carpenter dryer, McNally-Norton washer.

Pennsylvania State College, School of Mineral Industries, State College, Pa.—Pictorial display of work in resident instruction, extension services and research; new illustrated bulletin, "More Profit in Mechanical Mining"; other bulletins and textbooks.

Productive Equipment Corp., Chi-



Joy rubber-tired air compressor



Albert & J. M. Anderson Pow-R-Gard distribution box

cago — 4x10-ft two-deck Gyroset screen providing positive eccentric action with an adjustable stroke of 0 to $\frac{3}{8}$ in, available in either base-mounted or suspended types.

Reich Bros. Mfg. Co.—Improved-model Delatester float-and-sink testing machine with redesigned exterior housing and new hydraulic-lifting mechanism for lifting and lowering sieve pans with monel-metal sides and phosphor-bronze screens. The unit tests 50-lb samples of any size or mixture.

Roberts & Schaefer Co., Chicago—New Super-Airflow coal-cleaning units for nut, pea and 3/8x0 and 10-mesh fines, and the new RandS Froth-Flotation Hydrotator for recovering marketable coal from sludge and minimizing stream pollution. The unit, according to the company, recovers coal without settling and consists of the flotation unit proper with vibrating dewatering screen and circulating pump.

Features of the Super-Airflow units cited by the company include combined deck surface and air-resistance pack oscillated with short sharp strokes, longer deck with four draws, lower air volume, no zoning plate, air-tight seal and a screw conveyor discharging fine refuse or hutch material from the bottom of the air chamber. More efficient cleaning and a higher capacity are the results, the company states.

Robins Conveyors Division, Hewitt-Robins, Inc., Passaic, N. J.—Robins Fliptex dewaterizer and Robins Vibrex screen; Robins screen cloth.

Simplicity Engineering Co., Durand, Mich.—New Os-A-Veyor for horizontal or inclined installations up to 15 deg, where inclined conveyors cannot be installed. Operating at 1,000 rpm, the unit features a side-arm mechanism and drive and intermediate sections are in 10-ft lengths. Up to seven sections may be used, for a total of 70-ft in length; also Model D 4x12-ft. double-deck Simplicity gyrating screen and new horizontal screen now in production, featuring overhead adjustable drive.

Streeter-Amet Co., Chicago—New M-118-D recorder and automatic weighing machine for weighing mine cars in motion (*Coal Age*, October, 1948, p. 190) and MT-14 recorder and weigher.

Syntron Co., Homer City, Pa.—Grizzly feeder, picking table and sizing screen available in a package unit with capacities of 30, 50 or 100 tph, especially designed to serve small operations; dewatering screens; Syntron portable electric tools.

W. S. Tyler Co., Cleveland, Ohio—Ty-Rock double-deck vibrating screen with side-stretch screen on top deck and end-stretch screen on bottom deck, particularly designed to reduce blinding of wet fine coal; Ro-Tap testing sieve shaker; Tyler standard screen scale testing sieves; woven-wire screens.

United Engineers & Constructors, Inc., Philadelphia, Pa.—The Chance coal-cleaning process.

Viking Machinery Sales Corp., Jackson, Mich.—Model ESBU 50 oil-treating unit, with capacity of 50 tph, for application and control of the Viking hot-vapor-oil process.

Wedge Bar Screen Corp., Far Rockaway, N. Y.—Wedge-bar screens for all duties in any slot from 0 to 1 in.

Wedge Wire Corp., Cleveland, Ohio—Screens in various metals and opening sizes, including screens for Carpenter dryers and a new aluminum screen for vibrators.

Western Machinery Co., San Francisco, Calif.—Wemco heavy-media separation circuit; WKE (HMS) Mobil-Mill for heavy-media separation; new drum separator, cone separator and other Wemco equipment.

Power Units and Equipment

Allis-Chalmers Mfg. Co., Milwaukee, Wis.—Safety Circle electric motors featuring completely protected construction on top, bottom and both ends.

Louis Allis Co., Milwaukee, Wis.—Dc explosionproof motor, P-based pump motor with built-in thrust bearing, ac Bureau of Mines tested, totally enclosed non-ventilated explosionproof, Bureau of Mines ventilated dc, and splashproof motors; Adjusto-Spede ac variable-speed drive.

American Mine Door Co., Canton, Ohio—5-hp permissible explosionproof starter.

American Steel & Wire Co., Cleveland, Ohio—Tigerweld rail bonds, USS American electrical wires and cables.

Anaconda Wire & Cable Co., New York—Anaconda wire and cable, including new high-voltage shovel cable with built-in ground wires and new Neoprene-sheathed cable for use in tipple wiring.

Albert & J. M. Anderson Mfg. Co., Boston, Mass.—New Pow-R-Gard and Ground-Gard mine-distribution systems. Both provide circuit-breaker protection of men and equipment through series trip coils in the safety ground circuits.

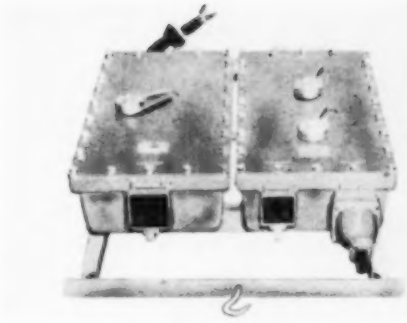
Ground-Gard units in dust-tight cases are recommended for use in non-gaseous mines and, the company states, safely and automatically disconnect the power from any circuit the instant a fault develops. Defective circuits are isolated and identified and control is placed in the machine-operator's hands.

Pow-R-Gard equipment, designed for permissibility, permits, in addition, plug extraction under load, provides quick and simple self-testing without cover removal, and eliminates the need for auxiliary control wires in trailing cables in either ac or dc service. Weight and dimensions, the company states, have been kept down to facilitate moving.

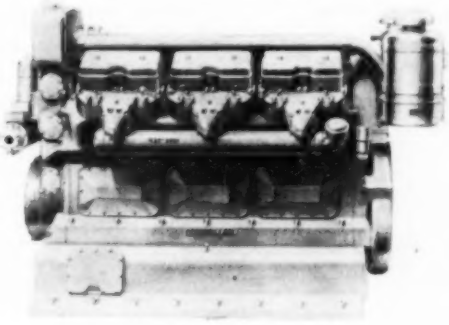
The Buda Co., Harvey, Ill.—Buda diesel engines for powering trucks and shovels, including the 225-hp 6-cylinder 6DCS844, the 265-hp 8-cylinder 8DC1125 and 325-hp 8DCS1125 and Buda 3-kw 32-volt dc generator set equipped with single-cylinder 38-cu in diesel engine.

C. & D. Batteries, Inc., Conshohocken, Pa. — Sylver-Clad battery, hardwood-tray battery assemblies, steel-tray shuttle-car batteries, hard-rubber Monobloc diesel batteries, ex-

Mines Equipment low-height Safety Circuit Center



Ensign explosion-tested distribution box



Caterpillar D397 diesel engine

O-B Smooth Underrun trolley frog

O-B Type R feeder switch with magnetic blowout

plosionproof auxiliary power batteries, the latest C & D Plasticell design of Monobloc plastic-container batteries for telephone and auxiliary power, and Motor-Generator Corp. automatic charging equipment.

Caterpillar Tractor Co., Peoria, Ill.—New 12-cylinder 500-hp D397 diesel engine, the largest of four new diesel engines recently introduced, including the 400-hp. D386, 334-hp D375 and 267-hp D364; D13000 electric set and new D318 diesel engine.

Cummins Engine Co., Columbus, Ind.—Cummins fuel pump, the 275-hp. Model NHBS-600 Cummins diesel engine and the recently announced NVHS-1200 Cummins diesel developing 550 hp at 2,100 rpm (*Coal Age*, April, 1949, p. 160.

Detroit Diesel Engine Div., General Motors Corp., Detroit—Model 6043C 60-kw ac generator set, 3-cylinder GM Series 71 diesel, Model 4031C 4-cylinder 2-cycle diesel industrial power unit and new GM-torque-converter and fluid-coupling unit specifically engineered to the GM series 71 2-cycle diesel. A matched pair of 190-hp torque-converter units (Models 6080 and 6081) shown are used in the new Euclid 1FFD 34-ton coal hauler.

Thos. A. Edison, Inc., Storage Battery Division, West Orange, N. J.—Mine-haulage-equipment storage batteries.

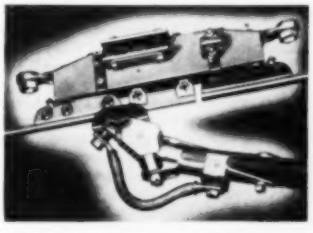
Electric Controller & Mfg. Co., Cleveland, Ohio—Tab-Weld plate resistors, frequency-relay controller for wound-rotor aerial-tram motors, Line-Arc repeating sectionalizer, Type WB ac brake and the new Valimitor starter for unlimited short-circuit protection of 2,300- and 4,000-volt motors (*Coal Age*, February, 1949, p. 190).

Electric Railway Improvement Co., Cleveland, Ohio—Rail bonds.

Electric Storage Battery Co., Philadelphia, Pa.—Ironclad batteries for mining use.

Elreco Corp., Cincinnati, Ohio.—New trolley nip so designed that strain is taken by a strain clamp rather than by the nip itself, sectionalizing insulators, feeder switches, line material and new permissible Qui-Connect cable-to-cable or cable-to-junction-box cable connectors said to confine arc and prevent additional damage. Splice can be made in the shop and taken into the mine for speedy connection, and the units are available with additional pilot wires.

Ensign Electric & Mfg. Co., Huntington, W. Va.—Rail bonds and feeder connectors, dc magnetic motor starters in both standard-enclosure and explosion-tested types, new explosion-tested heavy-duty pushbuttons for 110 to 600 volts ac or dc, new two- and three-insulator-type cable racks, new



O-B Type T section insulator with magnetic blow-out fuse

centrifugal switches for belt-conveyor protection, plus Agastat time-delay relays for sequence control of multiple-conveyor units, and new Ensign power-distribution boxes with safety lever-action plugs which can be disengaged under load.

Other features of the new distribution boxes outlined by the company include a new electrical circuit for interlocking and tripping the breaker, three-pole De-Ion breakers with shunt-trip attachments and built-in ground-current limiting device, any combination of circuits in either explosion tested or dust-tight enclosures, no tripping of breakers upon power failure, no circuit broken outside the enclosure, and only three wires re-

quired—positive, negative and safety ground.

Flood City Brass & Electric Co., Johnstown, Pa.—New cast-iron sealed-beam locomotive headlights, the R38 with a 120-volt lamp and the R46 available with either a 6- or 11-volt globe; new fused switches, 70- to 200-amp capacity, featuring a cast-iron waterproof case; and trolley line material.

General Electric Co., Schenectady, N. Y.—Tri-Clad motors with photo-electric starter controls; also new motors meeting U. S. Bureau of Mines specifications.

General Cable Corp., New York—Portable cables, electric wire and conductors for all mining uses, including aluminum-core steel-reinforced (ACSR) conductors.

Goodman Mfg. Co., Chicago—Controllers, switch boxes, junction boxes, trolley taps and ground clamps for underground service.

Gould Storage Battery Co., Trenton, N. J.—Gould Thirty and Kathanode batteries for underground haulage and new Gould Z battery plates manufactured by a newly developed casting method to obtain a non-porous grid that has heavy uniformly solid members throughout. The construction is said to provide more active material for longer service and greater capacity.

Guyan Machinery Co., Logan, W. Va.—New conveyor control, resistors for underground mining machinery and stationary motors, automatic dc motors starters and sealed-beam headlights for locomotives and loaders.

Harnischfeger Corp., Milwaukee, Wis.—New 2-cycle 3-cylinder P&H diesel engine featuring greatly improved torque characteristics, greater concentration of power and simplification of design for servicing and replacement of parts.

Hercules Motor Corp., Canton, Ohio—12 diesel and eight gasoline engines and power units, including several recent diesels, the Series DNX-V8 8-cylinder and three horizontal or "flat" 6-cylinder diesels, plus Models DWXLDF, DFXHF and DJXHF for varied mine applications.

International Harvester Co., Chicago—Diesel power units, including the UD-24—six cylinders, 1,375 rpm, 180 hp.

I-T-E Circuit Breaker Co., Philadelphia, Pa.—Metal-enclosed automatic sectionalizing breakers for dc circuits, standard three-pole breakers for surface applications, and the new multi-range overcurrent protective relay for protection both on- and off-shift. Designed for use with both KSC and KSA breakers, the new unit provides protection as follows: high range, up to 2,000 amp; low range, up to 400 amp, each calibrated 50 to 200%. It includes an auxiliary switch and resistor to lower the range of the breaker load-measuring relay.

Jeffrey Mfg. Co., Columbus, Ohio—Permissible distribution boxes with circuit-breaker protection and circuits for cutter, drill and room conveyor, with interlocked disconnect plugs on each circuit. The boxes are furnished with or without ground limit for 250 volts and without for 500 volts. Provision is made for remote control of the room conveyor and for a contactor to break the drill circuit, eliminating drill-switch failures. The boxes weigh 230 lb and are 9¾ in long, 20¾ in wide and 46½ in long.

Joy Mfg. Co., Pittsburgh, Pa.—New permissible WK-82-R 120-cfm rubber-tired air compressor for underground and surface use.

Mines Equipment Co., St. Louis, Mo.—New low-height permissible dust-resistant safety circuit centers to serve drills, conveyors and cutters, new String-A-Lite sectionalized lengths of cord with molded-in lights and connectors for temporary lighting, portable safety-circuit-center track unit replacing the fused nip, Neoprene for patching or replacing cable jackets, controls for stopping long belts in emergencies or roof falls, cable-fault finders, connectors for portable cables, electric switchman, vulcanizers, etc.

Mosebach Electric & Supply Co., Pittsburgh, Pa.—Rail bonds, section-insulator switches, wheels, splicers, pole heads and harps, gliders, feeder clamps, feeder relays; sectional, feeder, headlight and signal switches; frogs, cable splicers, trolley clamps, trolley taps, ground clamps and other electrical items.

National Mine Service, Beckley, W. Va.—Bemeco products, including NMS 45 and 68 controllers, cable reels, and intermediate gears, brush-holders, cable guides, armature and field coils and the new Bemeco "Locolite" sealed-beam locomotive headlight featuring spring-tension mounting for shock resistance.

Ohio Brass Co., Mansfield, Ohio—Complete line of power-handling products, including Types LG and KG permissible and Type M open multiple interlocking distribution boxes, Type BDG gasproof and Type M open motor starters, fused trolley taps, ground clamps, Mechano plugs, Type FG permissible splice boxes and new O-B Smooth-Underrun overhead trolley and feeder fittings.

The Smooth-Underrun fittings, according to Ohio Brass, make the trolley overhead as smooth as one continuous wire, permitting operation without bumps, blows and burns as a result of a design that grips the upper lobe of the wire only. Separable finger tips provide a smooth, level transition for current collectors at frogs and crossovers. Fittings include trolley and feeder clamps, splicers, frogs, section insulators and section-insulator switches.

Ohio Carbon Co., Cleveland, Ohio—Brushes for mining equipment, including loaders, shuttle cars and locomotives.

Okonite Co., Hazard Insulated Wire Works Div., Wilkes-Barre, Pa.—Hazard wire and cable, Hazaprene ZBF sheaths and Okonite splicing tapes.

Owens-Corning Fiberglas Corp., Toledo, Ohio—Demonstration of insulating and winding of dc armatures with Fiberglas electrical materials and Fiberglas insulation used in new and rewound motors.

Penn Machine Co., Johnstown, Pa.—Everlast and other Super-Weld rail bonds.

Post-Glover Electric Co., Cincinnati, Ohio—Steel-grid resistors for mining machines and locomotives, etc., automatic switches and other electrical equipment.

Reliance Electric & Engineering Co., Cleveland, Ohio—Ac and dc motors and renewal parts, including the new Reli-X hot-pressed coils, gearmotors and explosion-proof corrosion-resisting motors.

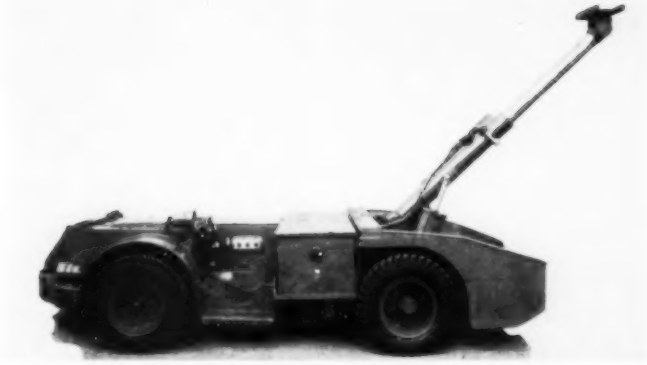
John A. Roebling's Sons Co., Trenton, N. J.—Electric wire and cable.

Rome Cable Corp., Rome, N. Y.—Rome 60 portable mining cables, including parallel-duplex type of trailing cable with Neoprene sheath and ground-wire construction and a series of safety posters stressing better handling of cable offered free of charge.

Simplex Wire & Cable Co., Cambridge, Mass.—Insulated wire and cable for mining, including new Tirex shuttle-car cable available in Type W and Type G styles featuring a ribbed or gear-shaped insulated conductor locked to the jacket by vulcanizing. The ribbed construction reportedly prevents the conductors from twisting, with the resilience of the covering bringing it back into place when twisted.

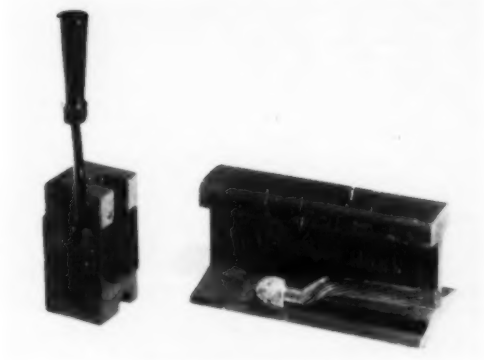
United States Rubber Co., Wire & Cable Dept., New York—Royal Gold (yellow-jacket) trailing cables.

Westinghouse Electric Corp., Pittsburg, Pa.—Westinghouse electrical products, including track-mounted portable 300-kw 275-volt-dc 2,400/4,160-volt-ac Ignitron rectifier, 46 in high for 42-in gage; 150-kva low-height dry-type transformer, 125 in over-all height, hermetically sealed and nitrogen filled, with explosion-proof sectionalizing panel and plug-in-socket connectors, constructed to permit installation near working places without additional housing or protection; high dry-type 150-kva power-center transformer and AJR and AVR dry-type transformers; ac and dc explosion-proof starters for hazardous atmospheres; high-voltage air-break switch for hoists or large-motor control; factory-assembled control centers for preparation plants, completely housed with all connections; Package-Drive speed control for variable-speed operation of dc motors from ac voltage; Westinghouse LifeLine motors in a variety of enclosures; heavy-duty shovel motor; AB breaker ground-fault-current limitor; lighting equipment for picking tables, flood and general lighting; locomotive headlights, rail bonds, line material, and electrical instruments.

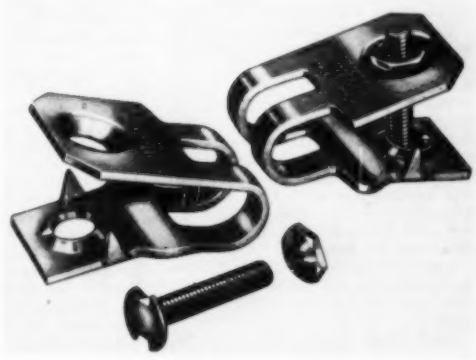


Lee-Norse RJ1 mine-service jeep

Austin permissible single-shot blaster



Erico Cadweld welder and bond joint



Armstrong-Bray hinged Plategrip belt fastener

Materials and Supplies

Acme Machinery Co., Williamson, W. Va.—Model 60 air-cooled rubber-tired compressor and Model 105 rubber-tired and truck-mounted compressors.

Ahlberg Bearing Co., Chicago—Roller-bearing mine-car wheels, company line of C.J.B. standard and self-aligning ball bearings, ball-bearing pillow blocks and Bower tapered-roller bearings.

Air Survey Corp., Washington, D. C.—Property, reconnaissance and survey maps for coal-mine management and engineering use prepared from aerial surveys, with Multiplex unit for locating contours in operation.

American Air Filter Co., Inc., Louisville, Ky.—Cycoil oil-bath cleaner for engines and compressors.

American Chain & Cable Co., American Cable and Hazard Wire Rope Divisions, Bridgeport, Conn.—Wire rope for underground and stripping use, featuring Acco-Loc safety splice slings.

American Cyanamid Co., Explosives Dept., New York—Explosives and permissible powders, blasting accessories and equipment.

American Brattice Cloth Corp., Warsaw, Ind.—ABC powder bags for transporting explosives.

American Steel & Wire Co., Cleveland, Ohio—Tiger Brand wire rope and fittings.

Armstrong-Bray & Co., Chicago—Steelgrip pullers; Wiregrip, Steelgrip and Plategrip conveyor-belt fasteners and repair units; and the new hinged Plategrip fastener using a thick-strap fastening unit with insert pin made up of a cable center with steel wrapping that locks in place (*Coal Age*, October, 1948, p. 184). The fastener itself, according to the manufacturer, facilitates a high-strength joint through the bite of the teeth and the countersunk sections. Hex heads on the bolts permit use of a socket wrench and facilitates application, in addition to making for a more-secure joint. The new fastener, it is stated, permits better operation with smaller pulleys and facilitates interchange and extension of belts, while the close fit prevents leakage of only the finest dust through the joint.

Atlas Powder Co., Wilmington, Del.—Explosives and blasting accessories, including newly improved and expanded Rockwell 16 milli-sec blasting system for both underground and strip operation. Providing 16 delays varying from 0 to 550 milli-sec, the new system reportedly offers better breakage with less degradation and better control, less noise, vibration.

Austin Powder Co., Cleveland, Ohio—Austin powders and permissible explosives, including new Austin permissible single-shot blaster, featuring shockproof and waterproof battery-less operation. Measuring 2⅜x 2⅛x1½ in and weighing 17 oz, the unit has no moving parts except a switch handle and can be fired only when the switch is moved.

Baker-Raulang Co., Baker Industrial Truck Div., Cleveland, Ohio, and **J. H. Fletcher Co.**, Chicago and Huntington, W. Va.—Baker Type TCJX mine tractor, Type YA-36 Trike (*Coal Age*, February, 1949, p. 180) and new Fletcher power greasing unit for conveyor-belt greasing designed to fit on either the Baker tractor or the Trike. Operating on their batteries, the

greasing unit is equipped with a Lincoln grease gun and 30 ft of hose.

Bearing Service Co., Pittsburgh, Pa.—Single-row, double-row, angular-contact and thrust ball bearings, cylindrical and spherical roller bearings, motor cartridge units designed to simplify changeover of stationary electric motors to anti-friction bearings, and other anti-friction units.

Bethlehem Steel Co., Pittsburgh, Pa.—Wire rope and hollow drill steel.

Bituminous Coal Institute, Washington, D. C.—Pictorial display of press information service, advertising, motion picture, radio and television programs, speakers' bureau, educational division and economic research.

Blackhawk Mfg. Co., Milwaukee, Wis.—Standard products, including socket wrenches, torque wrenches, hydraulic hand jacks from 1½- to 100-tons capacity, hydraulic pumps, valves, controls and maintenance equipment.

Broderick & Bascom Rope Co., St. Louis, Mo.—Yellow Strand preformed and non-preformed wire rope and Yellow Strand braided safety slings.

The Buda Co., Harvey, Ill.—Automotive-type lifting jacks.

Carnegie-Illinois Steel Corp., Pittsburgh, Pa.—AR (abrasion-resistant) steel for conveyors, chutes and similar applications, and USS Cor-Ten high-strength corrosion-resistant alloy steel for mine cars, truck bodies and other purposes.

Cities Service Oil Co., New York—Lubricants for mining, service facilities and the Cities Service heat prover.

Coal Mine Equipment Sales Co., Terre Haute, Ind.—Mining-equipment sales service, including rebuilding.

Cleveland Worm & Gear Co., Cleveland, Ohio—Speedaire Size 200 fan-cooled worm-gear reduction unit rated at 35½ hp, with a reduction of 9⅝:1, operating at 1,750 rpm.

Coffing Hoist Co., Danville, Ill.—Complete line of hoisting equipment, including Quik-Lift electric hoists, ratchet-lever hoists with capacities from ¾ to 15 tons, hoist jack and Mighty-Midget puller.

Colorado Fuel & Iron Co., Wickwire-Spencer Steel Div., Denver, Colo.—Wickwire wire rope for mining.

D-A Lubricant Co., Indianapolis, Ind.—Heavy-duty lubricants and engine oils, including new Extra-Treated diesel oil designed to reduce effects of high sulphur content of diesel oils (*Coal Age*, April, 1949, p. 168) and new 1-qt package for diesel oil for road, emergency or auxiliary supply.

De Laval Steam Turbine Co., Trenton, N. J.—Speed reducers and turbines.

Duff-Norton Mfg. Co., Pittsburgh, Pa.—Push-pull, bell-base, automatic-lowering, standard-speed, cable-reel, journal and hydraulic jacks, including the new Lo-Hite hydraulic jack with independent pump, new light-weight hydraulic journal jack, and new pinion puller with five sets of adjustable jaws. Capacity of the Lo-Hite jack is 30 tons; weight, 38 lb; closed height, 4½ in; raised height, 6½ in. Described as weighing 25% less, the new journal jack has a capacity of 15 tons. Weight of the 25-H-7.5 model is 35 lb and the closed and raised heights are 7½ and 11½ in. Weight of the 25-H-9.3 model is 38 lb and the closed and raised heights are 9⅜ and 15⅜ in.

E. I. du Pont de Nemours & Co., Explosives and Organic Chemicals Depts., Wilmington, Del.—Improved Neoprene products and displays featuring permissible dynamites, electric blasting caps and other blasting supplies.

Electric Railway Improvement Co., Cleveland, Ohio—Welding rheostats and welding accessories, including new Cadweld process for rail bonding or other copper-to-copper or copper-to-steel bonding that requires no outside heat. Powdered metals are dumped from cartridge into a small graphite crucible and ignited by a flint gun for a rapid permanent weld. Heavy equipment and the need for skilled labor are eliminated, according to the company.

Farval Corp., Cleveland, Ohio—Manual and automatic lubricating systems for various installations.

Flexible Steel Lacing Co., Chicago—Hinged Flexco belt fasteners, Flexco HD belt fasteners and rip plates for belt conveyors, Alligator belt lacing for flat transmission and conveyor belting and new Alligator wide belt cutter.

Flood City Brass & Electric Co., Johnstown, Pa.—Locomotive and mining-machine parts.

Gates Rubber Co., Denver, Colo.—Gates belts and Vulco ropes; Gates air hose, welding hose and other rubber products.

Goodman Mfg. Co., Chicago—Belt splicers.

Gulf Oil Corp., Pittsburgh, Pa.—Oils and greases for mining, including Gulf Mining Machine Lubricant B for cutting and loading machines, Journal Oil B for hydraulic systems and other purposes and Gulf E.P. lubricant for gear drives.

Guyan Machinery Co., Logan, W. Va.—Rail-bond welders.

Hamilton Rubber Mfg. Corp., Trenton, N. J.—King Koal underground conveyor belting; belting for other coal-mining services.

Harnischfeger Corp., Milwaukee, Wis.—New Model WFA-300 generator-type welder, 60- to 375-amp range, equipped for remote control; WN-200 gasoline-engine-driven trailer-mounted portable welder, with a range of 30 to 260 amp, that can be equipped with a new ac power take-off for small tools; 200-amp generator-type and transformer-type welders and accessories.

Hendrick Mfg. Co., Carbondale, Pa.—Grilles, screens and open steel flooring.

Hercules Powder Co., Wilmington, Del.—Permissible and stripping explosives, short-period delay caps and other blasting supplies, including new 23G Timesaver self-contained package for truck or rail shipment of Hercomites and Gelamites explosives. Use of the self-contained package eliminates unpacking and disposing of the usual shipping boxes.

Hewitt-Rubber Division, Hewitt-Robins, Inc., Buffalo, N. Y.—Hewitt hose, conveyor belting and other rubber products, including new Rubberlokt rotary wire brush featuring bristles locked in rubber for less vibration and longer wear.

Jaeger Machine Co., Columbus, Ohio—Jaeger Air-Plus stationary and portable 60-cfm packaged air compressor (also available to 600 cfm).

Jeffrey Mfg. Co., Columbus, Ohio—Conveyor chains, idlers, sprockets and replacement parts, featuring Steelcarve flame hardening.

Jones & Laughlin Steel Corp., Pittsburgh, Pa.—Special alloy steels, including new Jalloy heat-treated abrasive- and impact-resistant steel, Osticoloy low-alloy high-tensile steel, and J. & L. precision-built wire ropes, including the new CenterFit eight-strand rope, Permast and other ropes.

Kensington Steel Co., Chicago—Oro manganese and alloy-steel castings, chain and renewable-tooth sprockets, crusher parts, crawler treads, rollers, sprockets, dipper teeth, racks, pinions and other shovel parts.

Koppers Co., Inc., Pittsburgh, Pa.—Fire-resistant treated wood for mine-shaft applications and pressure-treated timbering.

Lee-Norse Co., Charleroi, Pa.—TJ1 track-mounted mine jeep and new RJ1 rubber-tired mine jeep fully equipped for five separate operations. In addition to serving as a utility truck for handling supplies and personnel and as a tractor to pull a trailer or other equipment, the unit is equipped with air-operated oil and grease guns for service as a lubricating unit, with an air-operated timbering boom and power saw for operation as a timbering machine, and a four-speed transmission for post pulling.

A. Leschen & Sons Rope Co., St. Louis, Mo.—Hercules Red-Strand wire rope in both preformed and non-preformed types, wire-rope slings, including the recently developed flat-laced slings, and the new Siler Insta rope clamp featuring a self-tightening principle permitting rapid connection and adjustment without tools.

Lincoln Engineering Co., St. Louis, Mo.—Lubricating equipment, including hand guns, fittings, bucket pumps, air and electric barrel pumps, Centro-Matic centralized lubricating systems, electric drum pumps and Kleenseal surface-check fitting with ball-in top.

Link-Belt Co., Chicago—Link-Belt gearmotors, herringbone reducers, Electrofluid drive, belt-conveyor idlers and a wide range of items from the

company's power-transmission and conveyor parts.

Macwhyte Co., Kenosha, Wis.—Wire rope, Atlas braided wire-rope slings and swaged fittings.

Martindale Electric Co., Cleveland, Ohio—Electric maintenance tools, including commutator-grinding stones and tools, undercutters and undercutting saws, growlers, ammeters, voltmeters, various testers and other electrical instruments, new air-driven undercutter, Model B bench-type adjustable growler and a 1½-hp electric blower.

Mine Safety Appliances Co., Pittsburgh, Pa.—Velocity Power tools.

Mining Machine Parts, Inc., Cleveland, Ohio—Replacement parts of improved design for underground machinery, renewable sprocket rims and conveyor chain.

Mosebach Electric & Supply Co., Pittsburgh, Pa.—Resistance welders.

National Cash Register Co., Dayton, Ohio—Model 145 payroll and labor-cost distribution machine, Class 3000 posting machine for calculation and recording of mine operating and other costs, and display of the machine payroll and bookkeeping system recently installed at the Olga Coal Co.

National Electric Coil Co., Columbus, Ohio—Electric-motor repair service, including winding of armature coils, examples of mine-locomotive field frames before and after rebuilding to standard dimensions by welding and machining and display of Silicone replacement coils.

National Malleable & Steel Castings Co., Cleveland, Ohio—Dragline chain, plain and swivel hitchings, castings, etc.

National Mine Service Co., Beckley, W. Va.—Hayden conveyor-belt fastening equipment (*Coal Age*, September, 1948, p. 168).

Nolan Co., Bowerston, Ohio.—Gear and wheel pullers, puller jacks and small tools.

Oliver Iron & Steel Corp., Pittsburgh, Pa.—Industrial fasteners, including bolts, nuts, studs, cap screws, pins and rivets, etc.

Osmose Wood Preserving Co., Buffalo, N. Y.—Osmose-treated timber for underground and other service.

Penn Machine Co., Johnstown, Pa.—Improved gears, pinions and other replacement parts for mining equipment, stressing increased facilities for producing difficult precision parts for the new types of mining machines.

Pittsburgh Gear Co., Pittsburgh, Pa.—Standard coal-mining replacement parts, including taper-serrated shaft and pinion and new Pittsburgh Armored gears guaranteed by the manufacturer to give an average service life of five times that of untreated steel, 1 to 1½ times that of oil-treated gears, and equal or superior to that of any other heat-treated gear in identical service.

Post-Glover Electric Co., Cincinnati, Ohio—New 37½-75-amp welder with arc grid element, heaters and other welding units.

Pure Oil Co., Chicago—Coal-mining lubricants, stressing extreme-pressure gear lubricants.

Quaker Rubber Corp., Philadelphia, Pa.—Conveyor belting, transmission belting and V-belts.

Raybestos-Manhattan, Inc., Passaic, N. J.—Ray-Man rayon and Whip-Wire steel-wire-member conveyor belting designed for high tension and long lift, belt fasteners, belting, hose, packings, friction material and other industrial rubber products.

H. H. Robertson Co., Pittsburgh, Pa.—Construction materials, including Galbestos, a protected metal for roofs and sidewalls; Q-panels (metal insulated sidewall panels); Q-floor (structural sub-floor utilizing cellular construction for electrical distribution systems); exhausting ventilators and Sheetlites lighting units.

John A. Roebling's Sons Co., Trenton, N. J.—Wire rope.

Security Locknut Corp., Chicago—New Security Locknut reported to provide positive dependable automatic locking in any position on the bolt without requiring bolt tension. An elliptical heat-treated alloy-steel retainer ring grips bolt threads with high-tension strength to prevent nut from rotating, the company says, with stress borne by nut, which can be readjusted or re-used without loss of locking power.

SKF Industries, Inc., Philadelphia, Pa.—Ball and roller bearings and pillow blocks, including new spherical roller-thrust bearing particularly designed for maximum thrust loads as found in heavier mining equipment.

Socony-Vacuum Oil Co., New York—Socony lubricants and lubrication-engineering service for coal mining.

Standard Oil Co. (Indiana), Chicago—Superla mine lubricants for all types of loaders and cutters and new heavy-duty cam-and-gear lubricant for walking draglines featuring strong adhesivness and extreme-pressure characteristics.

Standard Oil Co. (Ohio), Cleveland, Ohio—Sohio oils and greases for coal mining.

Stewart-Warner Corp., Alemite Div,. Chicago—Centralized, automatic and hand-operated lubricating units, controls and other equipment for handling lubricants including new electrically powered high-pressure grease-pump fitting 100-lb barrel, particularly designed for use on electric shovels; new hand-operated high-pressure grease pump designed to handle both heavy grease and semi-fluids, equipped with new Dyn-O-Mite gun that can be easily lifted out and operated independently to provide pressures of 8,000 to 10,000 lb; and new portable sprayer for spraying a wide variety of materials.

W. O. & M. W. Talcott Co., Providence, R. I.—Conveyor-belt fasteners and Acme steel-patch fasteners.

Tamping Bag Co., Mt. Vernon, Ill.—Wet-Strength tamping bags constructed of specially-treated wet-strength kraft paper.

Texas Co., New York, N. Y.—Oils and greases for coal mining.

Thermoid Co., Trenton, N. J.—Conveyor belting, flat transmission belting, V-belts, industrial hose, wire-braid hydraulic hose, brake linings and clutch facings.

Tide Water Associated Oil Co., New York—Tycol industrial lubricants for various mine operations, including new Tycol Anepro No. 2 semi-fluid extreme-pressure grease for prevention of galling, scoring and seizing of bearings and gears. Recommended as a mining machine lubricant, the new product reportedly makes possible reduction of the lubricants required at an operation to four basic Tycol products, thus simplifying storage and handling and insuring more effective and consistent lubrication. It also features proper leakage for flushing, excellent stability, high waterproof qualities and minimum resistance to motion when used in enclosed gear trains.

Timken Roller Bearing Co., Canton, Ohio—Timken tapered roller bearings, closures and other parts for mine cars and auxiliary mining machinery, with cutaway models of mine-car wheels, railroad-hopper-car wheels and gravity conveyor rolls, Timken alloy steel and seamless steel tubing.

Tool Steel Gear & Pinion Co., Cincinnati, Ohio—Gears, pinions and heat-treated shafting for underground and stripping machinery.

Trabon Engineering Co., Cleveland, Ohio—Reversible and non-reversible centralized lubricating systems adaptable to a wide range of equipment, including the newly improved KA-12 unit providing for lubrication at up to 50 to 80 points, with individual metering, and featuring automatic warning of clogged bearings or crushed tubes.

Bertrand P. Tracy Co., Pittsburgh, Pa.—Mining-machine parts.

Union Wire Rope Corp., Kansas City, Mo.—Tuffy dragline, mining-machine and general-purpose wire rope and new tuffy slings featuring nine-part fabric construction for unusual flexibility, strength and wear.

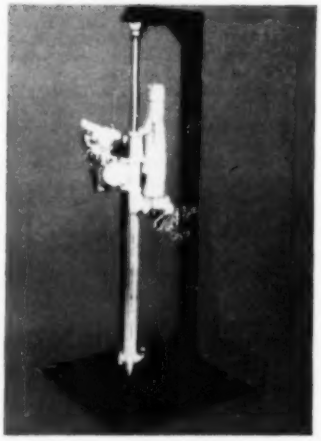
United States Rubber Co., Mechanical Goods Div., New York—Ustex nylon conveyor belting, friction tape, regular and V-belts, packing and other rubber goods.

Upson-Walton Co., Cleveland, Ohio—Wire rope.

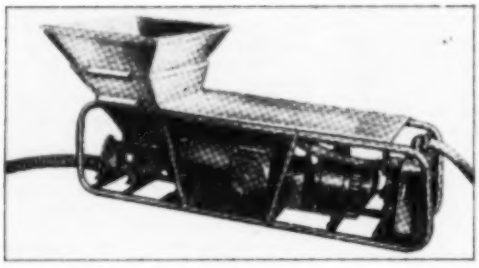
Western Cartridge Div., Olin Industries, Inc., East Alton, Ill.—Blasting caps and dynamites, including Minimax Ventless blasting caps, now offered in a newly expanded series of 10 delays, and dynamites manufactured by the Liberty Powder Co., Egyptian Powder Co. and Equitable Powder Co.

Westinghouse Electric Corp., Pittsburgh, Pa.—Westinghouse repair parts and district-repair-shop service, gearmotors, speed reducers, shovel gears, packing glands, etc.

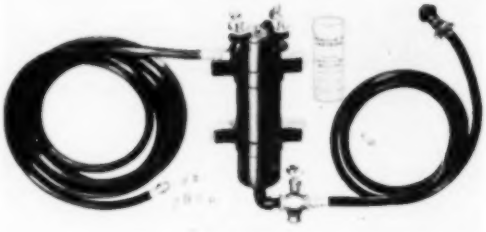
Joy TS-3 timber-setter



Joy Chain-crowd roof-bolting stoper



M-S-A Facedustor



Johnson-March Compound M proportioner

Safety and Ventilation

American Brattice Cloth Corp., Warsaw, Ind.—Mine-Vent flexible tubing and ABC brattice cloth.

American Mine Door Co., Canton, Ohio—Rock-dust distributing machine, available in dust-tight and permissible models.

American Steel & Wire Co., Cleveland, Ohio—Safety wire-rope slings and Cyclone fencing.

Armco Drainage & Metal Products, Middletown, Ohio—Armco corrugated-metal fan duct, tunnel and entry liner plate, conveyor covers, ventilating duct, air-pressure pipe and coupling. Steelox metal fan house.

Baker-Raulang Co., Baker Industrial Truck Division, Cleveland, Ohio, and **J. H. Fletcher Co.**, Chicago and Huntington, W. Va.—Baker Type SB timbering machine and the new Fletcher Load-Lift trailer for timber haulage, equipped with a Yale "Pul-Lift" to elevate the two end carrying bars on which timbers rest so that timbers are always kept level with side rollers and need not be lifted off machine.

Brown-Fayro Co., Johnstown, Pa.—Model BC tubing blower, with a capacity of 1,700 cfm through 300 ft of 12-in tubing, equipped with new permissible electrical equipment. Fan casing is made of corrosion-resistant semi-steel and the multi-blade-type impeller of stainless steel.

Deming Co., Salem, Ohio—Fig. 764 no-drip self-cleaning spray nozzles.

Duff-Norton Mfg. Co., Pittsburgh, Pa.—Mine roof and timber jacks, including pin-timbering jacks and the new angle-type jacks for crossbar timbering. The angle jacks include fishtail bases and an L-type safety head that holds the bar securely and prevents slipping and dislodgment. These jacks, it is stated, can be anchored safely at any angle out of the way of moving machinery.

E. I. du Pont de Nemours & Co., Fabrics and Finishings Dept., Wilmington, Del.—Ventube neoprene-coated tubing sewed with nylon thread.

Elliott Service Co., Inc., Mt. Vernon, N. Y.—Elliott coal-mine bulletin-board safety service, "Management Information" bulletin service and Elliott Employee Suggestion Service.

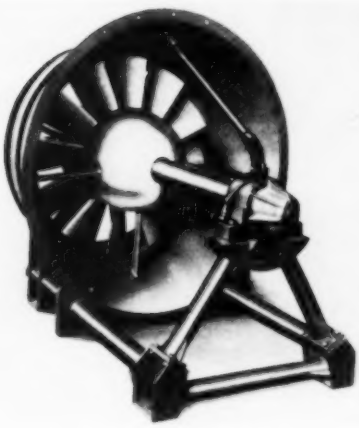
Farmers Engineering & Mfg. Co., Pittsburgh, Pa.—Femco Trolley-phones of improved construction and longer range, and Femco lightweight belt-carried 1-to-10 shot firer.

John Flocker & Co., Pittsburgh, Pa.—Dry-treated flame-resistant and mildew-resistant jute brattice cloth and Firestone plastic brattice sheeting distributed by the company.

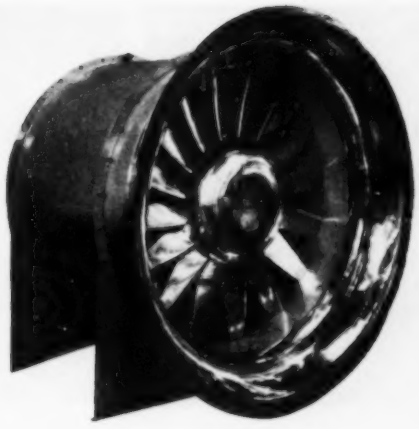
Fulton Bag & Cotton Mills, New York—Fulton Scotch-seam tamping bags and Blaze Braker brattice cloth. The latter is described as a heavy jute fabric coated with a fire-resistant mildewproofed non-porous flexible plastic stated to make it stronger, more abrasion-resistant, practically leakproof and able to carry air with less friction loss. Dirt and coal dust are easily removed, according to the company, while longer life results in an operating saving. The cloth is distinctively colored to aid visibility.

Fyr-Fyter Co., Dayton, Ohio—Complete line of portable fire-fighting equipment, including extinguishers ranging in capacity from 1 qt to 80 gal, a fully improved extinguisher for any type of fire risk, an Instant Model Fyr-Fyter using Karbaloy, and new stainless steel 2½-gal soda-acid and foam extinguishers 5½ lb lighter than copper units of the same capacity and with twice the bursting capacity of similar copper units.

Guyan Machinery Co., Logan, W.



Jeffrey 12-A series Aerodyne fan



Joy 1000 Series mine fan

Va.—Airflow indicator switch for signaling stoppage of fan.

Irwin Foundry & Mine Car Co., Irwin, Pa.—8-wheel man-trip car with a capacity of 38 men.

Johnson-March Corp., Philadelphia, Pa.—Compound M for dust control at the face, dump, loading machine or tipple, proportioning unit for liquid Compound M, a new Compound M cartridge and new Automatic Flow Proportioner for use with the cartridge, which automatically dissolves Compound M in the proper amount of water, with a flow of 1 to 7 gpm.

Joy Mfg. Co., Pittsburgh, Pa.—Joy room blowers, new high-pressure spray pump for more-efficient dust control with less water, new mine fans, new roof-bolting drills, new combination post puller and dozer and new timber setter.

The new Model TS-3 timber setter is described as a complete unit in itself. A large compartment in the body of the car holds a full shift's supply of timber. Either or both ends of the deck can be raised to facilitate transferring timbers onto the lifting boom, and the machine will handle bars up to 18 ft in length. Every operation—saw, boom swing, boom advance, boom lift, boom lock, floor jack, deck lift and cable reel is hydraulically powered. The only manual labor required is hauling the timber from the body of the car onto the timber holder over rollers. The machine, according to the manufacturer, will timber up to 9 ft high.

New roof-bolting stopers exhibited by Joy included a 29-in unit for low-seam mines and a special chain-feed unit to provide a long feed in medium-height operations. In the combination Postdozer, the puller is equipped with a bulldozer blade for maintaining shuttle-car roadways.

Features of the new high-capacity Axivane fan, according to Joy, are: lowest operating speed as a result of basic design, widest operating range as a result of the wide angle of blade adjustment, interlocking blades which turn simultaneously for quick adjustment, factory assembly for low-cost installation, and easy maintenance as a result of accessibility of bearings. In the new companion 1000 Series fans, the blades are individually adjustable, while mass production, it is stated, results in lower cost.

LeRoi Co., Cleveland Div., Cleveland, Ohio—Cleveland S11S stopers for roof bolting in weights from 85 to 100 lb and with feeds of 40, 34, 28, 22 and 16 in. Hole size is 1 to 1¼ in.

Martindale Electric Co., Cleveland, Ohio—Protective dust masks.

Miners Hardware Supply Co., Pittsburgh, Pa.—Mixer and extruder for producing clay stemming; safety belts for car droppers and other men working off the ground.

Mine Safety Appliances Co., Pittsburgh, Pa.—Safety equipment of all types, including the MSA mine-communication system and new products as follows: Pneophore oxygen therapy and resuscitation apparatus (*Coal Age*, March, 1949, p. 168), Maskfone, R-4 Edison cap lamp, Wolf Junior safety lamp, FaceDuster, Ten Shot blasting unit, continuous methane alarm and mobile safety station.

The Maskfone, according to MSA, permits clear two-way communication between men equipped with breathing apparatus over many miles of wire. It is voice-powered and requires no batteries or other external power source.

Providing 25% more light, according to the company, the Edison R-4 cap lamp also permits positive spot adjustment without any disassembly of the headpiece. Other features include four-cell nickel-iron alkaline battery, welded-steel cell containers, positive non-corrodible terminals and tough nylon-plastic case.

The MSA-Wolf Junior safety lamp is stated to be smaller and lighter and to provide a steadier flame longer and cooler-burning. Many parts are interchangeable with the standard model. Readings are obtained with increased ease and accuracy. The construction is corrosion-proof.

Described as a "truly portable" high-pressure rock-dust distributor, the MSA FaceDuster features a high discharge of 35 to 45 lb per minute through a 25-ft hose and minimum weight of 300 lb permissible and 225 lb nonpermissible. Height is 15 in without hopper extension, 18½ in with one height of hopper extension and 23½ in with another. The duster can be mounted permanently on mining machines, the company states, and can be handled in conveyor lines, facilitating the application of dust during the working cycle.

The Ten Shot blasting unit, approved by the U. S. Bureau of Mines, is declared to permit safe, positive multiple blasting. Features include: light weight, easy operation, sturdy construction, stainless-steel container, no extra batteries and no exposed live parts.

National Malleable & Steel Castings Co., Cleveland, Ohio—New expansion shield and roof-suspension bolts. Now under development, the shield is expanded on the upward thrust of the bolt, which may be recovered.

National Mine Service Co., Beckley, W. Va.—New wheat "Forty-Niner" electric cap lamp with battery jar of Butalite plastic and new lightweight-model Koehler flame safety lamp (*Coal Age*, January, 1949, p. 150).

Oliver Iron & Steel Corp., Pittsburgh, Pa.—New roof-support bolt assembly, including bolt, wedge and nut. Of carbon steel, the bolt is presently 1 in in diameter, available 3 to 8 ft long.

Quaker Rubber Corp., Philadelphia, Pa.—New QuaFlex fire hose (*Coal Age*, July, 1948, p. 171) and mine trolley-guard rubber.

Safety-First Supply Co., Pitts-

Wheat Forty-Niner cap lamp

M-S-A Edison R-4 cap lamp

Victaulic valve and hose coupling

burgh, Pa.—First-aid kits and other safety equipment, including Scott Air-Pak self-contained breathing apparatus, new Willson plastic Mono-Goggle and other protective goggles, face shields, respirators and gas masks, safety belts, Unox penetrant, new E & J resuscitator for reviving victims of all types of asphyxia, new Bullard plastic safety hat featuring moisture-proof and shockproof construction and greater wearing comfort and new Scott 6480A Demand inhalator for the administration of oxygen, with which patient is permitted to breathe normally.

Solvay Sales Div., Allied Chemical & Dye Corp.—Dust control with calcium chloride, featuring 36-in-wide calcium-chloride spreader for mine use.

Star Jack Co., Chicago—Lightweight aluminum-alloy roof and timber jacks, said to promote safety through wheel operation and to save 75% in setting time.

Tamping Bag Co., Mt. Vernon, Ill.—New flashing trip light of heavy construction to withstand long use; automatically shuts off when lying on face or side and is equipped with "B" battery with a life up to 2,500 to 3,000 hr.

Templeton, Kenly & Co., Chicago—Complete line of Simplex jacks, including pin-up and conventional-type roof jacks, two new timber jacks with aluminum-alloy housings (*Coal Age*, October, 1948, p. 191; January, 1949, p. 156), hydraulic jacks and pulleys, ratchet-lowering, post-puller jacks.

U. S. Bureau of Mines, Washington, D. C.—Methods of roof-suspension support.

Upson-Walton Co., Cleveland, Ohio—New "Dry-Proofed" brattice cloth.

Watt Car & Wheel Co., Barnesville, Ohio—New self-closing mine door and roof bolts.

West Virginia Steel & Mfg. Co., Huntington, W. Va.—New 1-in wedge- and expansion-shell-type roof bolts.

Pumping and Drainage

Allis-Chalmers Mfg. Co., Milwaukee, Wis.—A-C Electrifugal self-priming pumps.

Armco Drainage & Metal Products, Inc., Middletown, Ohio—Armco corrugated metal culverts, sheathing, spiral-welded pipe, and Multi-plate pipe and arches 6 to 8 ft long in diameters up to 15 ft.

Chicago Pneumatic Tool Co., New York—Pneumatically-operated sump pumps.

De Laval Steam Turbine Co., Trenton, N. J.—Centrifugal mine pumps.

Deming Co., Salem, Ohio—Packed pistons, ball valves and other mine-dewatering products, plus the following pumping units: Fig. 4700 deep-well turbine, Fig. 4022 two-bearing centrifugal with 3-in Duraloy water end, Vulcalock rubber-lined turbine-pump assembly, Fig. 4064-21M sump pump with float control, Fig. 1896 piston and Fig. 3313 3-in and Fig. 3312 2-in self-priming centrifugals.

Flood City Brass & Electric Co., Johnstown, Pa.—Plunger pumps.

Gates Rubber Co., Denver, Colo.—Gates Yellow mine hose.

Gorman-Rupp Co., Mansfield, Ohio—Gathering, sump and drainage pumps for both deep and strip mines, including the new Big Inch 23-lb 40-gpm 40-ft-head centrifugal for dewatering sumps and a new line of straight centrifugal pumps with various water ends and power sources in sizes from ¾ to 3 in for deep mines and up to 8 in for strip mines.

Jaeger Machine Co., Columbus, Ohio—Jaeger pumps, including a new-design 2-in gathering pump of nickle-iron and bronze, 4-in electric pump that will be available with special motor adaptations for use in hazardous locations and a 2-in electric pump developing 200 gpm at 25-ft static head.

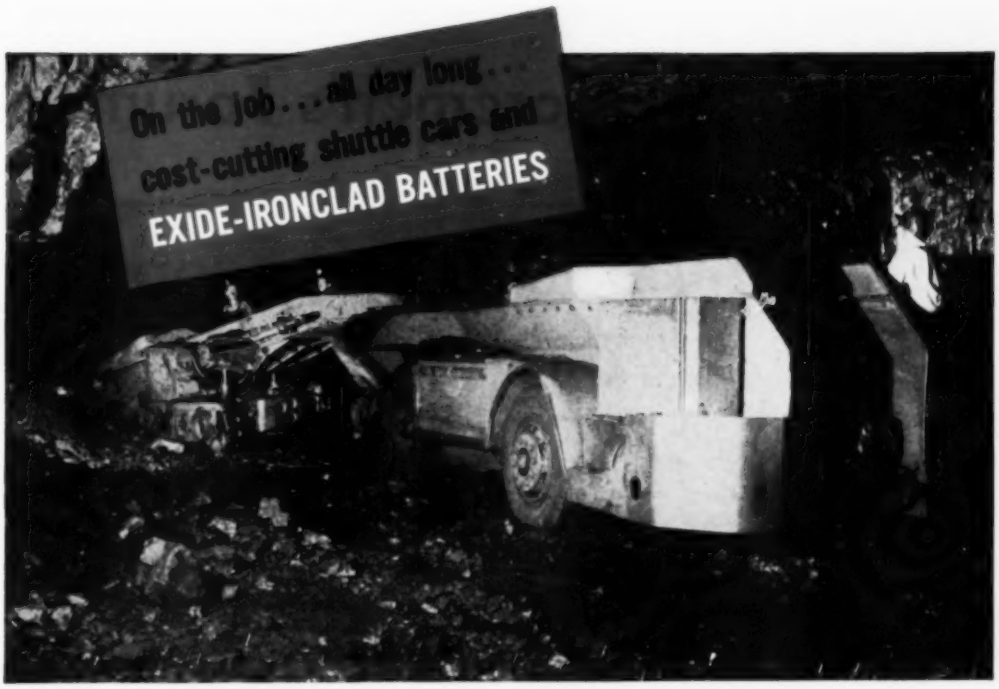
Jeffrey Mfg. Co., Columbus, Ohio—Type 61 12-in tubing blower and the new Type 12-A-48 slow-speed high-efficiency Aerodyne fan with automatic lubrication, quick servicing of bearing without removing the rotor and factory assembly for low cost. Described as a heavy-duty unit, the new fan has the following maximum ratings: pressure, 13 in; speed, 1,590 rpm; power, direct-connected, 500 hp; belt drive between bearings, 200 hp; overhung belt drive, 125 hp. The range of blade-angle adjustment is 280 deg, with a normal operating range of 60 deg. Features of this construction, as listed by the company, include the following: low tip speed and noise level, ability to operate without stalling except when completely blocked off, high static efficiency over a wide range, ability to reverse not only by reversing rotation but by reversing blade position, and a wide range of volume at a fixed mine resistance and speed by varying the blade angle only.

National Tube Co., Pittsburgh, Pa.—USS National pipe.

Quaker Rubber Corp., Philadelphia, Pa.—Mine suction and discharge hose, air hose, water hose, acid suction hose, rod and sheet packings.

United States Rubber Co., Mechanical Goods Div., New York—Water hose and packing.

Victaulic Co. of America, New York—Complete line of Victaulic pipe couplings and fittings ranging from ¾ to 60 in in diameter, including full-flow elbows, tees and reducers, Vic-Groovers from ¾ through 4 in, new shank attachment for hand groover fitting various makes of power drives up to 4 in, new hose connection in sizes up to 12 in for connecting Victaulic pipe to hose and new plug valves, ¾ to 2 in, with new gates valves now in production, 2½ to 12 in.



EXIDE-IRONCLAD BATTERIES are *DIFFERENT!*

Exide-Ironclad Batteries are different in CONSTRUCTION . . . in PERFORMANCE. The difference is due chiefly to the unique positive plate, which consists of a series of slotted tubes containing the active material. So small are these slots that, while permitting easy access of the electrolyte, they retard the active material from readily washing out or jarring loose. The result is a battery that assures peak performance with full shift availability and many extra months of service.

Exide-Ironclad Batteries have ALL FOUR of the characteristics that a storage battery must have to assure maximum performance from mine locomotives, trammers and shuttle cars—high power ability, high electrical efficiency, ruggedness and a long life with minimum maintenance. The combination of these Exide-Ironclad characteristics assures years of day-in, day-out service with dependability and economy.

SAFE DEPENDABLE POWER

"Exide-Ironclad" *Reg. Trade-mark U. S. Pat. Off.*

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THE ELECTRIC STORAGE BATTERY COMPANY, Philadelphia 32 • *Exide Batteries of Canada, Limited, Toronto*

The Foremen's Forum

Cost-Cutting on the Job

Why Cost-Cutting Is Always Important—What Coal-Mining Costs Involve—Where the Major Cost-Cutting Opportunities Are—What Supervisors Can Do

COAL-MINING COMPANIES keep harping on costs for much the same reasons other companies do—because low cost means a low price and a low price, if based on low cost, means good business at a profit. Without a low cost, a high price must be charged or the price must be cut either by sacrificing a reasonable profit or, in extreme cases, by using up the company's assets, with bankruptcy as the inevitable result.

Competition is the big reason why prices must be kept low. Individual coal companies and coal regions compete with each other and the industry as a whole competes with gas and oil, water power and other sources of fuel and energy, including the sun itself, which is the source of heat in the so-called "solar houses" now being experimented with.

But even if competition was not a major factor, low prices still are important to the health and well-being of an industry or an individual company, since low prices stimulate increased use of the product. This means more business, more jobs at higher wages and salaries, and a better dividend picture for the investors who risked their money to make the enterprise possible.

The cost of a ton of coal involves quite an imposing list of expenses. For instance, the OPA, in reporting on industry results during the war, broke down bituminous costs as follows:

Producing Costs

Mine labor:
- Day men
- Mining, day workers
- Mining, piece workers
- Mining, stripping and loading (strip mines)
- Yardage and deadwork
- Mine supervisory and clerical employees
- Vacation payments

Mine supplies:
- All supplies except power and coal
- Purchased power
- Coal used to produce coal

Other mine expenses:
- Salaries and expenses (other mine employees)
- Mine-office expense
- Hired trucking to tipple, ramp, etc.

Other operating charges:
- Taxes on mine property, equipment, etc.
- Corporate, privilege and severance taxes
- Sales taxes not paid by consumer
- Social security, old-age-benefit tax
- Unemployment tax
- Compensation insurance
- Vocational-disease insurance
- Insurance (all other)
- Rental of equipment
- Royalties
- Depletion—sustained
- Depletion—percentage
- Amortization
- Depreciation
- Operators' association dues and assessments

Administrative Costs

- Salaries and expenses, officers (except selling)
- Salaries and expenses, clerical and others
- Office expense and rent
- Legal
- Depreciation, office equipment
- All other administrative expenses

Selling Costs

- Salaries, commissions and expenses, salesmen
- Salaries, commissions and expenses, officers
- Salaries and expenses, clerical
- Rent and office expenses connected with selling
- Advertising
- Depreciation, office equipment and automobiles
- Commissions, affiliated sales agents
- Commissions, non-affiliated sales agents
- Discounts and allowances, distributors, etc.
- Commissions, marketing agencies
- All other selling expenses

In 1945, according to OPA, the cost of a ton of bituminous coal was as follows:

Mine labor	60.2%
Mine supplies	16.9
Other mine expenses	1.8
Other operating charges	14.4
Administrative costs	2.6
Selling costs	4.1

The selling percentage is somewhat higher now as a result of a return to a buyers' market, but otherwise the proportions represented by the various items are approximately the same. The anthracite picture is substantially the same except that the mine-labor percentage is around 65.

The Big Three in coal cost, it will be noted, are mine labor, mine supplies and other operating charges. Since the last is made up largely of taxes and other fixed charges, there is little that can be done to achieve a reduction on the job. But it is a different story as far as labor and supplies are concerned. Supervisors on the job, in effect, dish out every dollar that is spent for labor and mine supplies. If they use labor and supplies inefficiently and wastefully, the cost of coal is bound to go up. Some hints on promoting efficiency and reducing waste are summarized in the following.

The Machine Factor

Machines, because they multiply the power of men's muscles and never get tired, are the big key to increased productivity and a lower labor cost. Machines naturally include automatic and semi-automatic controls for such things as pumps and substations, which reduce the manpower necessary for operation. But while a machine has the ability to do vastly more work than a man, it also can be handicapped so that it cannot produce to the fullest. When it is down for any reason, production stops but wage payments go on, running up the cost.

The major goal in reducing cost

Want better mine lubrication...with fewer lubricants? You're looking at the answer.

Would you like to have *4 or 5* lubricants doing the jobs for which you're now using *10 to 15* specialized lubricants? You *can*. And get a *better* lubrication job while you're doing it! Just join the increasing number of mines that are switching to Marathon multi-purpose lubricants. That's the way to simplify your job...reduce the chance of error...cut down on the number of lubricants you have to account for and handle. Sounds worth-while, doesn't it? Why not write, wire or phone, today...ask for a Marathon Mine Lubrication Engineer to call and work out a complete maintenance program with you?

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Cost-Cutting Opportunities for Supervisors on the Job

therefore, is keeping machinery in operation at rated capacity as much of the shift as possible. This involves primarily close scrutiny of what might be called services—power, supplies, maintenance, transportation and so on. If the services are up to snuff, the machine—and its operators—will naturally produce at a rate close to or at capacity. Keeping services up to snuff is the main job of supervision.

Power

Because machines can't run without juice, power is perhaps the logical place to start in tightening up on cost. The rule is: Rated voltage at the motor on each unit. This means: (a) substations close to the working sections, (b) feeder capacity as necessary and (c) trailing cables big enough to carry the load. De machines, especially, are sensitive to voltage drops. Low voltage means, first, that machines will not work as fast as they should and therefore will not produce as much. Second, when machines loaf along and the circuit breaker keeps flying out, the men get into a "Why worry" frame of mind and slack off—not necessarily intentionally but because there doesn't seem to be any point in putting out when the machines aren't. Third, bad power means more blow-ups and more breakdowns, not only reducing output but increasing repair cost. The alert boss, therefore, takes a close interest in his power supply.

Maintenance

Machines that are down do not produce coal, while the fact that they are down means that cost inevitably goes up. Regular inspection of machine condition is the first step in good maintenance. Next is making repairs when they are needed and before some part fails and results in a big breakdown. Lubrication when and where needed is a major item in keeping machines running. Another is good power, since heating with low voltage cooks insulation and insulation failure means a blow-up or a burn-out. In addition, mechanical failures also are responsible for what might look like electrical failures. A worn bearing, resulting from faulty lubrication, dirt and the like, might, for example, result in an armature dropping down on the frame. On the other hand, stiff working parts, as a result of lack of lubricant, dirt, etc., might throw sufficient extra load on the motor to materially shorten the life of the insulation through excessive heating.

Supplies

It might seem that supplies would not have much direct effect on crew productivity and labor cost. Such, however, is not the case. If a place has to be left because there isn't timber on hand to make it safe to work in, the machines have to move extra distances and production may be curtailed because the number of available places was reduced that much. Then, there is another type of supply—repair parts. A chain link or flight in the supply house outside instead of in the section might result in the two—or three-hour delay instead of, perhaps, 15 min. Maximum production results when the right kind of supplies, in the right quantities are on hand where they are needed when they are needed.

Cycle Balance

Unless the loading unit, whether it is a machine or a man, is functioning, nothing is coming out while wage payments keep right on. If the loading machine or conveyor, therefore, is idle much of the time waiting on cutting, drilling, shooting or some other operation, that is the signal for some intensive work toward getting balance in the cycle. In fact, the goal should be adjustment of the cycle to the point where the loader always has coal ahead.

Moving Time

A machine might always have coal ahead of it but only because moving time is excessive. This might result from: (a) long moves or (b) small tonnages per cut. A third reason might be obstacles, such as coal, slate or timber in the road. To reduce moving time, obvious steps are keeping roads clear and adjusting development to reduce traveling distance to a minimum, usually by proper positioning of crosscuts and keeping all places in condition to be worked, thus eliminating skipping and backtracking.

Tons per fall have a major effect on moving time and consequently on productivity and cost. If, for example, places made only 20 tons, the machine would have to move 15 times to produce 300 tons. If the tons per place was increased to 25, only 12 moves would be required, providing from, say, 15 to 30 min extra producing time. Driving places as wide as possible, with due regard to roof conditions, is one way of increasing production per fall. A second is cutting places as deep as possible, either by using the full length of present cutter bars or installing longer ones. If, with a 7-ft bar, average cut depth can be increased from 6 to 6½ ft, tons per fall can be increased approximately 8%, or enough to make a real difference in moving time.

Transportation

Without transportation, production is impossible. And if the transportation set-up is slow and inefficient, production at the maximum possible rate likewise is impossible and cost goes up. What are some of the things that result in poor transportation? They include: (a) bad track, (b) failure to keep changing switches close to the face, (c) no partings or partings too far from the working section, (d) excessive shuttle-car hauls, (e) poor transfer facilities which make it impossible for shuttle cars to discharge at the maximum rate and (f) poor car-changing arrangements at belt heads, thus making frequent belt stoppages necessary. All these come under the supervisor's direct jurisdiction. By concentrating on improvements, he can achieve a major increase in production with a corresponding cut in cost.

Waste

Everything used around the mine costs money. In addition, the mine product—to wit, coal—also costs money. Increasing recovery therefore means preventing waste in a big way, thus keeping down mining cost. Increasing recovery requires careful attention to development, room work and pillaring, because places that are stopped or are lost because of squeezing or other hazards means the loss of the coal on which the company has laid out money. Careful watch over day-to-day mining operations and pillar recovery therefore should be a major supervisory job.

Waste in mine supplies can concur in the following ways: (a) loss in the coal or gob, (b) breakage or destruction in handling, (c) improper use or application and (d) failure to practice good preventive maintenance, meaning that big breakdowns and increased destruction of machine parts are much more likely to occur.

To prevent supply waste, therefore, the following are among the rules that should be followed: (a) have good section storage depots, including cabinets, tool boxes, etc.; (b) order and keep on hand no more supplies than necessary for normal operations; (c) check on the use or misuse of materials and parts; (d) keep machines in top-notch operating condition; and (e) work on crew members to educate them in the proper use and conservation of materials and parts.

How mining is done also may have a vital influence on the consumption of materials. In shooting for example, one drilling pattern might result in a cost—powder and caps—of 15c per ton, whereas careful study of the problem and adoption of a different pattern might make it possible to get equally good results at a cost of not over 10c per ton. Experience at a number of operations has proved that savings of this order or even greater are quite frequently possible.

In this brief summary, it naturally has been impossible to point out every cost-saving possibility on the job. However, it does indicate the possibilities—and the opportunity available to every supervisor. By cashing in on it, he will help keep his mine working and thereby protect his job and his income, in addition to putting himself in line for promotion to something better.

CALL IT THE "COMPOSITE VALVE"—the giant that would result if *all* the valves in a plant were *one* valve. As pictured here, its proportion to other equipment in this detailed model of an automobile factory is fairly accurate. Representing your total valve investment, its size may surprise you, but it must be considered in any plan for economical plant operation.

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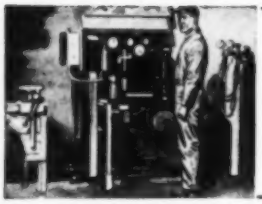
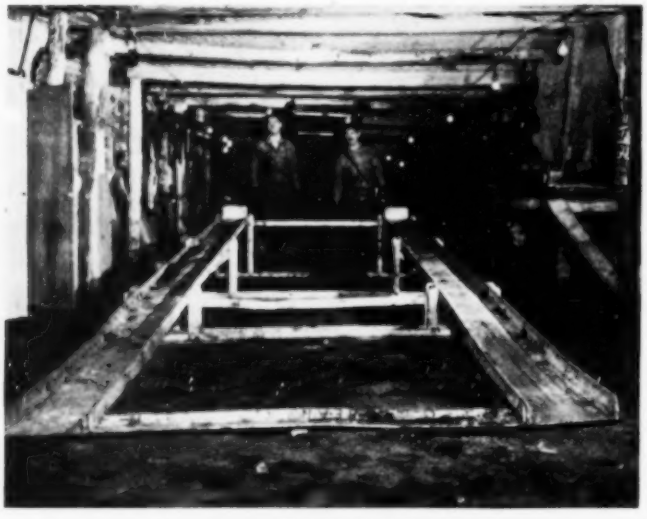


Operating Ideas

Ramp Speeds Shuttle-Car Maintenance Underground

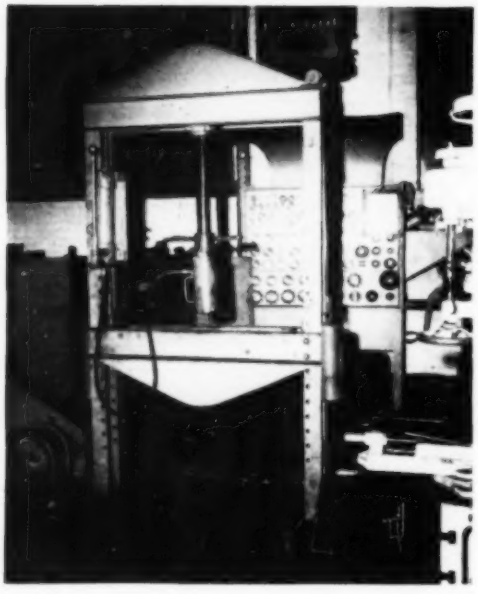


GREASING, INSPECTION AND MAINTENANCE of shuttle cars in the sections have been made much safer and the time involved in some of the jobs cut to a fraction of that formerly required by the installation of semi-portable steel ramps in Mine No. 25, Consolidation Coal Co. (W. Va.), Clarksburg.

When a shuttle car is headed or backed onto the ramp, the forward tires are raised 24 in—a compromise height dictated by the length of ramp it is practical to move and install and, in some cases, by the clearance of the crossbars holding the roof coal. By loosening the bolts, a ramp can be disassembled into six sections for moving.

Until a year ago, shuttle cars at this operation were jacked and blocked when it was necessary to get at the underside.

SHUTTLE-CAR MAINTENANCE RAMP at Mine No. 25, Consolidation Coal Co. (W. Va.), with H. D. Murphy (left) and G. B. Boggs, mechanics, standing at the rear.



Shop-Built Press Proves Versatile Unit

SCREW ADJUSTMENT, hydraulic action, a counterbalanced backing bar and slotted columns for straightening of shafts are features of a locally built vertical press used in the shop at the Wildwood, Pa., mine of the Butler Consolidated Coal Co. The screw is a standard part from an Oldroyd loading machine. A Blackhawk hydraulic jack with an 8-in travel and settings of 15, 25 and 50 tons is fastened to the bottom of the screw.

Throat width is $2\frac{1}{2}$ ft and the vertical capacity is 4 ft. Slots 3 in wide and 15 in high opposite each other at bench height in the webs of the 6-in I-beams accommodate shafts up to 3 in for straightening. Cables, pulleys and counterweights offer safe and simple height adjustment of the backing bar. Use of the screw with a hydraulic jack of relatively short movement provides a considerable range of operation without moving the backing bar. P. W. Dobson, master mechanic, was responsible for the design and construction of the press.

SERVING in the mine shop where it was built, this vertical press offers several valuable operating features.

Euclid Dump Trucks **HAUL MORE AT LOWER COSTS** with body sections of J&L OTISCOLOY high-tensile steel

J&L STEEL

Above, welding a twenty-two-ton-capacity Euclid truck body made of J&L Otiscoloy High-Tensile Steel parts.

J&L OTISCOLOY in trucks, built for the toughest hauling jobs, pays off for both the manufacturer and truck operator.

The Euclid Road Machinery Company, of Cleveland, Ohio, has *six* good reasons for building vital parts of bodies for its heavy duty hauling equipment out of J&L OTISCOLOY *High-Tensile* Steel. These bodies are built to meet today's toughest hauling requirements—*at low operating costs.* Every useless pound of dead-weight is designed *out* of the bodies in order to handle largest possible loads at high speed. Stamina is all-important, because these trucks operate in off-the-road service—in mines, quarries and heavy construction work.

The six reasons why Euclid uses J&L OTISCOLOY are:

1. **OTISCOLOY is twice as strong as mild steel.**
2. **OTISCOLOY has 50% greater fatigue resistance than mild steel.**
3. **OTISCOLOY has 4 to 6 times greater resistance to atmospheric corrosion than mild steel.**
4. **OTISCOLOY has substantially greater abrasion resistance than mild steel.**
5. **OTISCOLOY is easily welded by any of the standard methods.**
6. **OTISCOLOY can be readily cold formed.**

If you are interested in eliminating *useless* dead-weight, obtaining better resistance to corrosion and abrasion, get *all* the facts on J&L OTISCOLOY *High-Tensile* Steel. Let us send you the booklet mentioned in the coupon.

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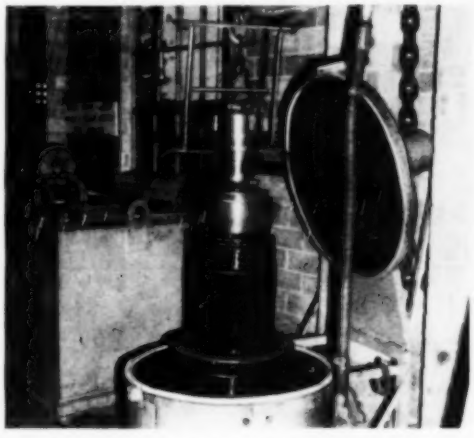
ARMATURE DIPPED into varnish vat. Small armatures are hung by light wire for draining and drying, heavy armatures by a chain hoist. After drying, armature is . . .

LOWERED INTO OVEN and suspended on special framework. Chain hoist is removed, temperature recorder connected and thermostat inserted through oven wall before . . .

LID IS LOCKED DOWN, making oven practically airtight. Flexible pipe reaching to floor of oven draws off cool air and helps maintain oven temperature until . . .



BAKING IS DONE and armature is suspended above oven to cool. This streamlined operation cuts manual labor to a minimum, helps keep floors clean and adds to shop safety.

Vats Ease Armature Varnishing and Baking

TWO SPECIALLY MADE and equipped vats sunk into the floor speed the job of varnishing and baking armatures, help to keep a clean shop and cut manual labor in the electrical shop of Pittsburg & Midway Coal Mining Co., Scammon, Kan.

Both vats, one containing armature varnish and the other serving as a baking oven, are 42 in in diameter and 6 ft deep, with hinged lids that fit snugly on the rim. A 2-ton electric hoist, running on an overhead track, lowers heavy armatures into the dipping vat, lifts them out after the varnish has penetrated to all desired areas and suspends them aloft for draining and drying. Smaller armatures, like the one shown in the top left-hand photograph, may be dipped by means of light wire, which then is hooked over the rim to allow draining and drying.

The baking vat, or oven, shown in three of the accompanying photographs, in addition to its 6-ft depth has a still deeper hole in its floor to accommodate the armature shaft. It is insulated with a 2-in layer of asbestos boiler lining and heat is provided by 6,250-watt electric strip heaters. The grooved lid makes the oven nearly airtight.

After the chain hoist carries a dried and drained armature from the dipping vat to the oven, the armature is lowered into the oven, where a special steel frame, resting on four small steel benches just inside the rim, supports it after the chain hoist is withdrawn, as shown in the second photograph. Thermostatic controls, seen in the same photograph, protrude like two fingers into the oven near the top and electric wiring, threaded through the wall and visible on the left side of the photograph, leads from a sensitive thermometer inside the oven to a temperature recorder, seen just above the closed oven in the third photograph.

With the oven lid locked down and the heat on, as shown in the third illustration, a flexible pipe passing through an aperture in the lid and extending to the oven floor draws off cool air from the bottom. The outside boxes for the thermostats are seen in place near the top of the oven.

After baking is completed, the cold-air exhaust pipe is lifted out, the thermostats are removed and laid aside and the armature is cooled while suspended by the chain hoist above the oven.

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- In every KING KOAL BELT is incorporated the essential qualities for economical conveying of coal with the positive assurance of long and uninterrupted service.
- For the ultimate in coal mine conveyor belting, specify KING KOAL CONVEYOR BELTS by

We will gladly submit a sample upon request.

ADVANTAGES

- Resists severe impact . . .
- High tensile strength
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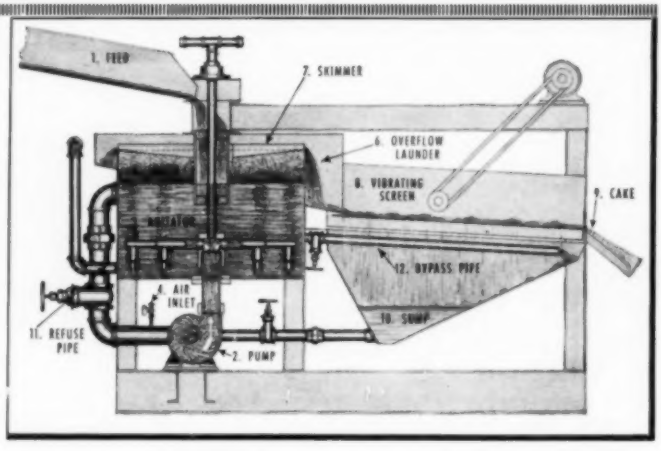
★ *RECOVERS MARKETABLE COAL FROM SLUDGE ORDINARILY WORTHLESS* ★ *RECOVERS COAL WITHOUT SETTLING*
★ *MINIMIZES POLLUTION OF STREAMS AND RIVERS*

What it Does

The new R and S Froth Flotation Hydrotator cleans and separates fine coal from sludge formerly considered of no commercial value.

It recovers coal without settling; yet the equipment occupies only a fraction of the space required by a thickener large enough to effect similar recovery by gravity. Froth is killed instantly and delivered in cake form.

Water is clarified and pollution of streams and rivers is minimized—important today in view of increasing government regulation on this point.



How it Works

1 After suitable conditioning, coal enters tank through Feed Chute and Feed Well.

2 Circulating Pump takes water from side of main tank and delivers it to tank bottom through . . .

3 Agitator, which distributes circulating water and coal uniformly over tank bottom, from where they rise to pump intake level.

4 Air is drawn into pump through a valve, is distributed over bottom with water and coal. Coal rises with air bubbles as . . .

5 Froth, which overflows into . . .

6 Overflow Launder, with aid of . . .

7 Skimmer, attached to rotating Feed Well and Agitator. Froth flows to . . .

8 Vibrating Screen, which "kills" froth and delivers it as . . .

9 Cake (low ash and dewatered). Water and entrained high ash coal, together with excess reagent, pass screen to . . .

10 Sump, where they join pump circulation and are returned to main tank.

11 Refuse, with all excess water from feed, is discharged from tank bottom by adjustable tube which controls level of water below frothing zone.

12 Bypass pipe to provide sluicing water.

Result of Years of Study

Incorporated in the R and S Froth Flotation Hydrotator are features developed by R and S engineers through years of study and experiment. Every important detail of this new unit has been checked and rechecked under actual operating conditions in Roberts and Schaefer Company's own plant.

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In addition to its experimental laboratory function, the R and S Testing Plant is available for testing carload samples representative of your actual production. Users of this service receive a detailed report which includes: (1) Complete screening test showing percentages of various sizes; (2) Cleaning test on each size, showing raw coal, cleaned coal and refuse with ash and sulphur percentages on each and rejection obtained; (3) Complete float-and-sink determination on total sample with theoretical washability curve; and (4) Conclusions and recommendations. If desired, the entire car of cleaned coal may be reshipped for further full scale coking or boiler plant tests. The only charges are for labor and power—no charge for engineers' services.

More Information

For complete details on this new Roberts and Schaefer equipment, for information on Testing Plant Service, and for competent counsel on your individual coal preparation operations, get in touch with R and S engineers. They can help you make prepared coal profitable coal.

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This is particularly true when cars are built of U·S·S Cor-Ten.

For Cor-Ten not only makes it possible to build cars of lowest weight per cubic foot of capacity but supplies superior resistance to atmospheric corrosion, gives added resistance to abrasion, shock and fatigue and this assures the longest possible car life.

16,000 mine cars, built larger, stronger, or lighter with U·S·S Cor-Ten are today in service in America's most progressive mines. They're working under all sorts of conditions. In thin seams and thick seams, in dry mines and wet mines. Although more than a thousand have been in use for well over ten years, we have yet to hear of a single failure due to wear.

Particularly significant is the fact that 53% of all Cor-Ten cars have been built on repeat orders—after the original cars had shown in service how much better they would stand the gaff.

Today, U·S·S Cor-Ten is ready to help you build greater efficiency into mine cars. Our engineers will gladly cooperate with yours in applying Cor-Ten to your designs to assure optimum results at minimum cost.

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AFTER 15,000 cubic yards of well broken rock allowed rapid, low-cost digging, gave minimum delay in uncovering the coal. Ask your Du Pont Explosives representative for complete information about "Nitramon" and other Du Pont blasting supplies and accessories.

This West Virginia stripping has an eight-foot seam of high-grade bituminous coal covered with 33 to 50 feet of sandstone. For some years the contractor has been using "Nitramon"* to break this overburden because of its efficiency, economy and safety.

Charges may be loaded immediately after holes are drilled—no lost holes or expensive relocation of drills. Primacord fires the holes—no caps in the holes or on the job until time of firing.

"Nitramon" is safe to handle—safe to use. It cannot be detonated by blasting caps, friction or the impact of falling objects. However, use of a "Nitramon" primer—itself relatively insensitive—can be relied on to fire charges of all sizes.

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News Round-Up

Union to Meet Southern Group in Contract Talks

REPRESENTATIVES of the Southern Coal Producers Association and the UMWA planned to meet May 25 at Bluefield, W. Va., to negotiate a contract to replace the one expiring June 30. Agreement on the time and place of the meeting was reached by Joseph E. Moody, president of the southern operators' group, and John L. Lewis after a conference in Washington, D. C., May 13. Producers and mineworkers each will send eight representatives. The union group will include two men from international headquarters and the presidents of UMWA Districts 17, 19, 20, 28, 29 and 30.

Earlier, on May 17, it was announced that Harry Moses, president, H. C. Frick Coke Co., had received a letter from Mr. Lewis in which the union president offered to meet the U. S. Steel Corp. subsidiary in wage talks. Mr. Moses declined to comment.

In mid-April, Mr. Moody had given formal notice of termination of the present contract and had asked the union to suggest a time and place for a meeting with the Southern group. The May 25 date was settled upon after an exchange of correspondence in which Mr. Lewis was reported to have suggested an early date in June. It was Mr. Lewis' suggestion that the conference meet in Bluefield. On May 23 it was announced that Mr. Lewis would attend the Conference.

Meanwhile, on May 1, the 60-day deadline set by the Taft-Hartley Act for giving notice of termination of contract passed without word from either the mineworkers' union or other groups of operators except the Southerners. However, operators from the North, the Middle West and the Far West were reported to have met in Washington at the call of Ezra Van Horn to map their strategy for wage talks, whenever they may be called for. At the same time, the union's 200-man policy committee gathered in Washington to frame demands. Although there was no official comment from the union meeting, best guesses were that Mr. Lewis would seek a 6-hour day and 30-hour week without loss of pay to the miners and a substantial increase in the 20c-per-ton welfare-fund royalty. Operators, on the other hand, were expected to oppose Mr. Lewis' demands and to seek clarification of the "memorial-period" clause and the "able-and-willing" provision in the present contract. Lower prices for coal and a slump in demand would be the backbone of the operators' argument.

Other developments on the labor front included action by trustees of the Anthracite Health & Welfare Fund lowering the pensionable age of anthracite miners from 62 to 60 years, thus conforming to the pattern set earlier by the bituminous fund; the union's hiring of George Creel, leading public-relations expert for the government during World War I; purchase by the union of a building adjoining the one now housing the Bituminous Welfare & Retirement fund; and an unconfirmed rumor that the mineworkers had purchased controlling stock in the National Bank of Washington, presumably to handle the welfare program's money.

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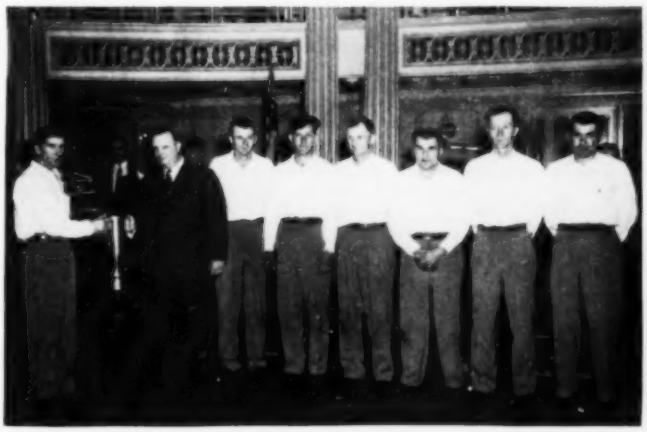

Goodyear Mine Team Keeps All-Ohio Cup After Third Win

WINNER of the First Aid Demonstration at the All-Ohio Safety Congress, held in Columbus April 13, was this team from the Goodyear mine of the Wheeling Township Coal Mining Co. As this was the team's third win, and in fact its third straight win, it will retain permanent possession of the championship cup. Teams from the Dun Glen and Piney Fork mines of the Hanna Coal Co. placed second and third in the contest and that from the Wolf Run mine, Warner Collieries Co., was fourth.

Members of the Goodyear team above are: Capt. Lewis Jesalosky (left), shown receiving the cup from R. W. Morse, vice chairman, Ohio Industrial Commission, Kenneth Grear, Joseph Erdos, Geo. Weir Jr., Fred Marshall, Rennie Bradley, patient, and Orlando Cimini, alternate. Accompanying the team to the congress and demonstrations were: Clyde L. French, Goodyear mine personnel manager, H. D. Jack, assistant superintendent, Norval Edwards, mine foreman, D. C. Wilson, assistant treasurer, Norman Vanscoy, Willard Lewis and the mine safety committee.

Big Sandy-Elkhorn Institute Holds Second Annual Seniors' Day As . . .

UNDERGROUND at Consol (Ky.) Mine No. 204, some 150 high-school students, in groups of 15, saw a loading machine fill a shuttle car (left) and a rubber-tired cutting machine make a shear cut (right), as part of an underground tour featured at the Second Annual Seniors' Day sponsored by the Big Sandy-Elkhorn Coal Mining Institute.

ON THE SURFACE, students watch a 5-ton shuttle car discharge to a 15-ton mine car via an elevator (left). After a lunch and a visit to the portal buildings and maintenance shop, the students heard Maurice D. Cooper (right), director of vocational training, NCA, and James L. Patton, director, Mayo State Vocational School, discuss opportunities in coal mining.

150 High School Seniors Tour Coal Mine

THROUGH THE COURTESY of the Consolidation Coal Co. (Ky.), about 150 senior boys from high schools of Floyd, Letcher, Pike and Johnson Counties, saw modern mining machinery in operation at Mine No. 204, Jenkins, Ky., Saturday, April 30, as a part of the Second Annual Seniors' Day sponsored by the Big Sandy-Elkhorn Mining Institute, in cooperation with the Mayo State Vocational School and the Big Sandy-Elkhorn Coal Operators' Association.

The boys were shown through a new contour mining section developed underground to a distance of 500 ft and situated within a quarter of a mile of the modern Quonset portal buildings (*Coal Age*, May, 1948, p. 96). Following lunch served by the Big Sandy-Elkhorn Coal Operaters' Association and Champion Stores, Inc., the group was taken through the portal buildings and heard talks on coal mining as a vocation and the opportunities it offers.

Groups were hauled to the portal of the contour mine in 38-passenger covered mine cars, the trip including a short detour through underground passages of Mine No. 204. In groups of 15, the boys walked underground, where they were shown engineers' spads set in the roof, saw tests for gas and solidness of roof at the face, witnessed the setting of a crossbar and posts with a Baker-Raulang battery-powered timbering machine, shear cutting by a Joy-Sullivan 11RU rubber-mounted machine equipped with water sprays on the cutterbar and the loading of a 5-ton Joy cable-reel shuttle car by a Joy 14BU loading machine. Just outside the portal, they saw the shuttle car discharge its load to a 13-ton 8-wheeled Differential Steel mine car via a Joy elevator.

Equipped with a portable public address amplifier, William Stapleton, superintendent, Mines Nos. 204 and 207, and Seth H. Kegan, superintendent, Mine No. 214, and president of the Big Sandy-Elkhorn Coal Mining Institute, took turns explaining the underground operations on the spot.

After lunch, the boys were assembled in the maintenance shop for talks by James L. Patton, director, Mayo State Vocational School, and Maurice D. Cooper, director of vocational training, National Coal Association. Maintaining that it will be decades before atomic energy threatens coal and that the increasing use of coal in power plants will in a large measure offset the loss to diesel locomotives, Mr. Cooper predicted that in coal mining "the rising generations will find opportunity for profitable work under good conditions for many years."

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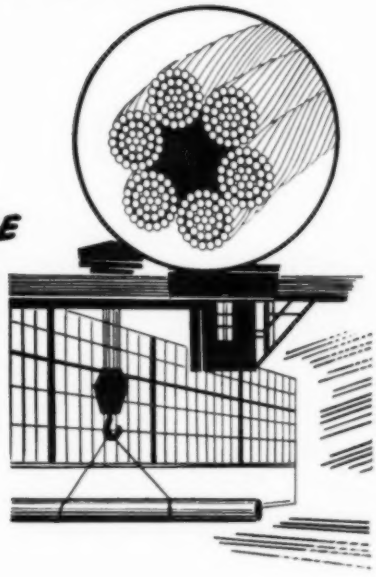

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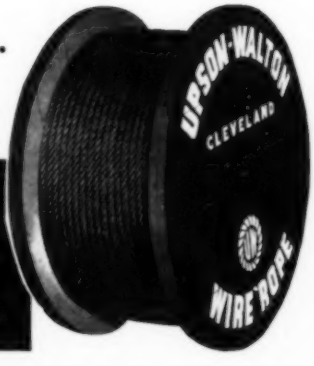

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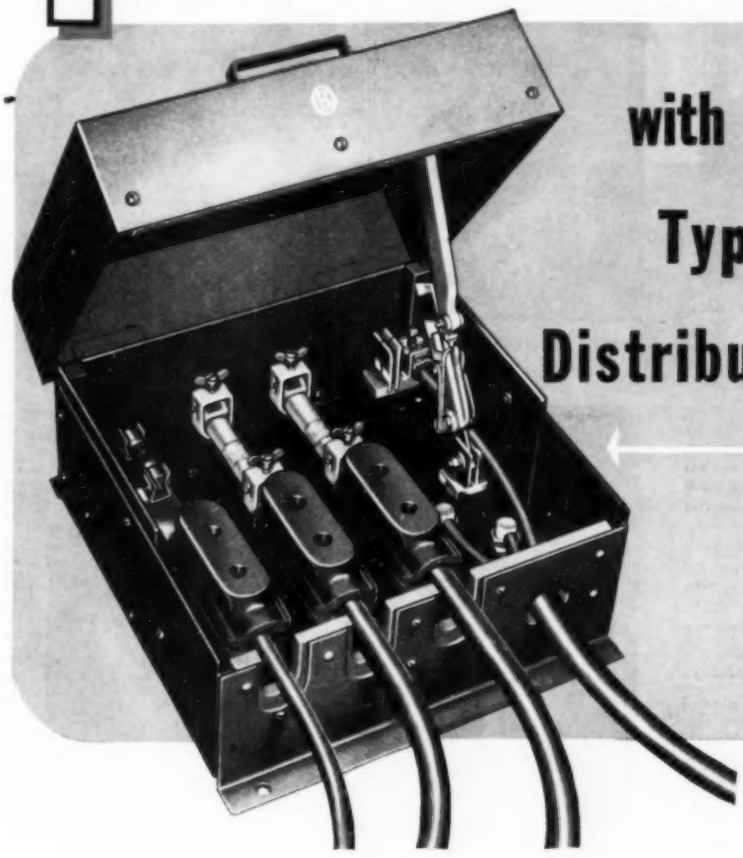

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PAUL B. ENTREKIN formerly vice president and manager, Bethlehem Chile Iron Mines, has been named general manager of the mining division of the Bethlehem Steel Co., with responsibility for all mining operations of the company. A graduate of Lehigh University, Mr. Entrekin joined Bethlehem in 1925 as an engineer. The following year he became plant engineer at the Cornwall mine and was successively mine superintendent and assistant manager. In 1941, he was appointed mine superintendent and assistant manager of the El Tofo, Chile, mine of Bethlehem's subsidiary and became vice president and manager of that company on Jan. 1, 1944.

New Union Pacific Coal Operating Appointments

JOSEPH Q. BERTA (left), newly named mine superintendent, and Tony Taucher Jr., assistant mine superintendent, Union Pacific Coal Co., Superior, Wyo.

ROBERT BOWIE (left), Stansbury, Wyo., and Lawrence Welsh, Reliance, Wyo., newly appointed assistant mine superintendents at Union Pacific operations.

Personal Notes

L. Russell Kelce has been elected president of the Sinclair Coal Co., Kansas City, Mo., and its numerous affiliated coal companies, succeeding the late **Grant Stauffer.** Mr. Kelce, who first went to work in the mines as a boy still in school, was formerly vice president and general manager of the companies. Leaving high school in Pittsburg, Kan., to work full-time in the mines, Mr. Kelce became a mine superintendent at the age of 19. Following military service in World War I, he started a strip mine at Dawson, Okla., and arranged with Mr. Stauffer to market the coal. In 1924, they pooled their mining and sales interests and started the organization that is now ranked as the 14th largest producer in the country. Both Mr. Kelce's grandfather and his father were coal miners and his father, now 82, retired as a foreman for Sinclair nine years ago and lives in Pittsburg.

Advancement of **Merl C. Kelce,** vice president in charge of operations, to executive vice president of the organization also has been announced. **T. L. Kelce,** general superintendent, has been elected a vice president.

A. F. Cook, superintendent, Junior mine, Red Jacket Coal Corp., Red Jacket, W. Va., has been named superintendent of the company's Red Jacket mines, following the retirement of **E. F. Smith,** superintendent of the Mitchell Branch mines. Mr. Cook has been active in the mining industry for 33 years, 27 of which have been at Red Jacket. With his retirement, Mr. Smith concludes a mining career of 38 years, the last 25 at Red Jacket.

L. W. Ingles, general superintendent, Cribbs-Goodman Coal Co., Florence, Colo., has been named superintendent of the Kebler and Pictou mines of the Colorado Fuel & Iron Corp., succeeding **J. L. McBrayer,** who retired May 1. Previously a long-time C.F.&I. employee, Mr. Ingles first started in the mining engineering department and was later made superintendent of the Kebler mine in 1934. He also served as superintendent of the company's Crested Butte mine before leaving it in 1946 to join Cribbs-Goodman.

John Welch, section foreman, Mine No. 7, has been appointed mine foreman, Mine No. 16, Island Creek Coal Co., Holden, W. Va., replacing **Elbert Parsley,** resigned. Mr. Welch first joined the company in 1925 and has held supervisory positions at several of its mines since 1937.

Curtis E. Hutson, Sesser, Ill., formerly employed by the Valier Coal Co., has been appointed an Illinois state mine inspector for District 19. Mr. Hutson succeeds **Ed Mallaburn,** Johnson City, who has been transferred to District 18 to replace **Ray McClusky,** Carterville, resigned.

Harry Sanford, associated with the

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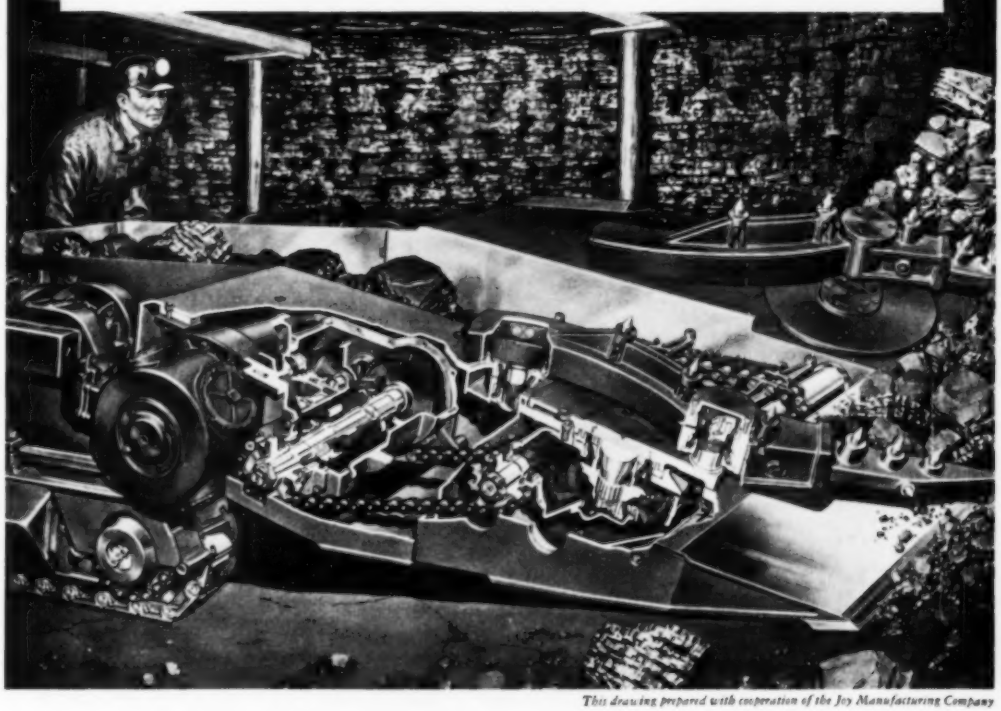

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Labor Official Completes 59 Years With Hudson Coal

J. B. T. JONES, for more than 25 years assistant general manager in charge of labor relations for The Hudson Coal Co., Scranton, Pa., retired May 1, after 59 years of active service with the company.

Mr. Jones began his career with The Hudson Coal Co. in 1890 as a messenger boy at what was then the Legitts Creek Colliery in Scranton. Working his way up from that job, he became a clerk, later a colliery weighmaster, and after working in other capacities, he became division engineer in 1910. He remained in that capacity at the company's collieries in Wilkes-Barre until 1916, when he was appointed colliery superintendent at Laflin colliery.

His promotion continued, with appointment in 1920 to a similar position at two of the company's larger operations, Delaware and Pine Ridge collieries. In 1923 he was put in charge of labor relations for the company, with the title of assistant general manager.

In his more than 25 years' service in this capacity, Mr. Jones established for the company an enviable reputation for fair dealing in the handling of its labor relations, particularly in the presentation of cases before the Anthracite Board of Conciliation.

Mr. Jones lives in Forty-Fort, Pa., and there, too, has established an enviable reputation as a leading citizen, well known in every community affair having to do with the improvement of living conditions. He has been a particularly extremely active worker and an effective solicitor for the Community Chest there.

U. S. Bureau of Mines since 1942, has been named engineer-in-charge of the Bureau's Johnstown, Pa., sub-district office. **E. E. Quenon**, head of the Johnstown office since 1947, has been promoted to assistant supervising engineer, District C, with headquarters at Mt. Hope, W. Va.

R. W. Hanna, formerly assistant general manager, has been named executive vice president, Virginia & Pittsburgh Coal & Coke Co., Fairmont, W. Va.

J. H. Williams has been appointed fuel engineer for the Fairmont Coal Bureau, New York. Mr. Williams has previously been a consulting engineer in the power field with both Gilbert Associates and Burns & Roe, Inc.

James S. Laird, formerly associated with the Coal Division, E. G. & F. Associates, and the Island Creek Coal Co., has been named assistant to the general manager, The Gay Coal & Coke Co. and Gay Mining Co., Mt. Gay, W. Va. A graduate of Virginia Polytechnic Institute, Mr. Laird spent four years in the army in the Pacific and was discharged a major. **Oscar Staley**, section foreman, No. 3 mine, Gay Coal & Coke, has been appointed general mine foreman, No. 1 mine, Gay Mining Co. **John Dean**, night foreman, No. 2 mine, Gay Coal & Coke, has been promoted to general mine foreman of that mine. **Eugene Kitchen**, section foreman, No. 3 mine, has been made night foreman of that mine, succeeding Mr. Dean.

MILTON H. FIES

Milton H. Fies, manager of coal operations, Alabama Power Co., Birmingham, Ala., has been named a consulting engineer to the Office of Synthetic Liquid Fuels. Dr. Fies will continue his affiliation with the Alabama Power Co. He obtained his technical education at Columbia University's School of Mines and was employed successively as engineer and superintendent of mines for the Republic Iron & Steel Co., general superintendent of mines for the Birmingham Coal & Iron Co. (now Woodward Iron Co.), vice president in charge of operations for the DeBardeleben Coal Corp. and as a private consulting engineer before becoming associated with the Alabama Power Co. in 1945.

John G. Moffat, partner, Moffat Coal Co., Scranton, Pa., has retired from the organization. Mr. Moffat was secretary-treasurer of the company until formation of a partnership by the three brothers recently. **Robert Y.** and **W. K. Moffat** will continue the partnership.

J. L. McBrayer, who retired as superintendent, Pictou and Kebler mines, Colorado Fuel & Iron Co., after 32 years service with C. F. & I., was honored Friday evening, April 29, by some 250 company and mine officials, miners, state officials and others, who gathered at the auditorium of the Tioga, Colo., high school. Following talks by many of those attending, Mr. McBrayer was presented with a gold watch, a gift of his employees at the Pictou and Kebler mines. Mr. McBrayer plans to retire to a farm near Pueblo, Colo.

Lloyd C. Williams, combustion engineer in the Cleveland office of the Lorain Coal & Dock Co. and the Lorado Coal Mining Co., has assumed additional duties and is now in charge of all preparation at the Lorado, W. Va., mines.

E. L. Thrower, vice president, Warner Collieries Co., Cleveland, Ohio, retired April 1 as the first employee to retire under the recently announced Warner retirement plan for supervisory employees. At a dinner in his honor, Mr. Thrower was presented with a gold pocket watch in appreciation of his 36 years of service with the company. Mr. Thrower first joined Warner in 1913 as a mining engineer, was made assistant general manager of mines in 1915, general manager of mines in 1920 and vice president in 1945. A member of the board of directors, Mr. Thrower is expected to continue with the company in an advisory and supervisory capacity for an indefinite period. **H. Thomas Douglass** has been named assistant personnel manager for Warner Collieries in Ohio. Mr. Douglass previously was active in personnel work for the government and for the last three years was manager of the Veterans Administration office at St. Clairsville, Ohio.

Raymond C. McKelvey, has been appointed controller of the Penowa Coal Co., Pittsburgh, Pa., replacing the late Henry G. Peterson. Mr. McKelvey formerly was chief accountant, H. K. Porter Co., Inc., Pittsburgh.

C. B. Scholl, associated with the Boone County Coal Corp., Sharples, W. Va., for 31 years, resigned May 1 as chief engineer of the company. Mr. Scholl first joined the company in 1918 as an engineer, served as superintendent from 1919 to Aug. 13,

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1946, when he was made chief engineer. Mr. Scholl, president of the Coal River Mining Institute for the past two years, is moving to Lake Washington, W. Va., where he plans to become a contractor of home building.

Howard E. Wetzel has been appointed a mining engineer, Mining Branch, Conservation Div., U. S. Geological Survey, and will assist in the supervision of mining operations on leased government land in the Salt Lake City, Utah, district. Mr. Wetzel, with the U. S. Bureau of Mines for seven years, previously was associated for 12 years with the Consolidation Coal Co. (W. Va.) and the Carter Coal Co.

●

Obituaries

James W. Bristow, 60, secretary-treasurer, Illinois Coal Strippers' Association, Chicago, died April 13 in the Illinois Central Hospital, Chicago, following a sudden illness. Mr. Bristow had been associated with the Illinois stripping group for 11 years and had devoted a great deal of his time to the improvement of the industry's public relations through land-reclamation activities. Previously he had been managing director and executive vice president of the Illinois Reciprocal Trade Association.

Addison W. Lee Jr., 64, vice president in charge of operations, Louisville Gas & Electric Co., Louisville, Ky., died April 30 at his home after an illness of several weeks. Mr. Lee had been active in the development of gas and electric facilities in the Louisville area for more than 42 years.

Jesse G. Saunders, 75, a retired coal official, died April 13 at his home in Otterbourne, Va. Mr. Saunders began his coal career in Fayette County, West Virginia, later working for 36 years in McDowell County. For 25 years he was general superintendent of Premier Pocahontas Colliery Co. Earlier, he served as superintendent of the coal properties of Justus Collins and he also organized the Lamb Coal Co. in Kentucky.

William P. "Billy" Mullen, 76 died April 26 at St. Mary's Hospital, McAlester, Okla., following a week's illness. A well-known coal operator in the area for 40 years, Mr. Mullen was active in labor negotiations during the '30's as a representative of the Arkansas-Oklahoma Coal Operators' Association and also was on the Coal Code Authority for the region. Mr. Mullen had recently retired and had started a cattle business.

Peter M. Saxman, 60, president, Saxman Coal & Coke Co., Philadelphia, Pa., died April 27 at his home in Villanova, Pa.

●

Association Activities

National Coal Association has announced the election to its board of directors of L. Russell Kelce and Joseph T. Berta. Mr. Kelce, recently elected president of the Sinclair Coal Co., succeeds Grant Stauffer on the NCA board and Mr. Berta, president, Pennsylvania Coal & Coke Co., succeeds the late Charles O'Neill.

Ohio Coal Association at its annual meeting in Cleveland May 4 reelected all its officers, as follows: R. L. Ireland, president; E. H. Davis, vice president; Ezra Van Horn, executive vice president; E. H. Miller, secretary-treasurer; and F. H. Bohecker, assistant secretary-treasurer.

Indiana Coal Producers Association has elected Hugh B. Lee, Maumee Collieries Co., president, succeeding Fred S. McConnell, Enos Coal Mining Co.

Anthracite Outlook Is Conference Theme

BURNING METHODS for small anthracite sizes, the possibility of using silt for making fuel gas and synthetic liquid fuels, advances in mining methods and a review and forecast of market conditions were among the subjects of papers presented at the 7th annual Anthracite Conference at Lehigh University, Bethlehem, Pa., May 5-6. Other subjects included design of homes for better use of solid fuels, technical studies of the properties of anthracite, and retail problems. More than 400 industry leaders, educators and engineers attended the two-day meeting.

Results of research in the thermal and electrical properties of anthracite and bituminous coal were presented in the first paper of the convention, by Dr. C. C. Wright, chief, and J. D. Clendenin, assistant professor, Division of Fuel Technology, Pennsylvania State College, and K. M. Barclay, fuel chemist, Chemical Construction Corp., New York City. Dr. R. T. Gallagher, associate professor, Department of Mining Engineering, Lehigh University, presided at the first session.

Supporting their observations with tables and charts, Dr. Wright and his associates reached the following conclusions about the thermal and electrical properties of coal:

1. Specific heat of coal, or the ratio of heat capacity to that of water at 15 deg C, ranges between 0.2 and 0.4 and depends on the nature and composition of the coal, usually increasing with moisture content and volatile matter and decreasing with ash content.

2. Thermal conductivity, or the time-rate of heat transfer by conduction, increases with higher apparent density, volatile matter, ash content, moisture and temperature. Monolithic coal is a medium conductor of heat, pulverized coal a poorer conductor. Thermal conductivity appears to be greater parallel to the bedding than perpendicular to the bedding.

3. Thermal diffusibility, or the measure of the speed of temperature waves through a body, increases slightly with the increase of rank in coals. The thermal diffusibility of pulverized coal decreases with decreasing particle size, increases with closeness of packing and is less than that of solid coal.

4. Thermal expansion, or the ration of change in length per degree to the length of 0 degree C, depends on the orientation of anthracite to the bedding plans. This is not true of bituminous. Both bituminous and anthracite, however, have about the same coefficient of linear expansion as other carbon materials. These coefficients increase with higher temperatures.

5. Specific resistance of bituminous is considerably greater than that of anthracite. It decreases with higher moisture content and increases with temperature, volatile matter and ash. Vitrain and clarain have a higher specific resistance than fusain.

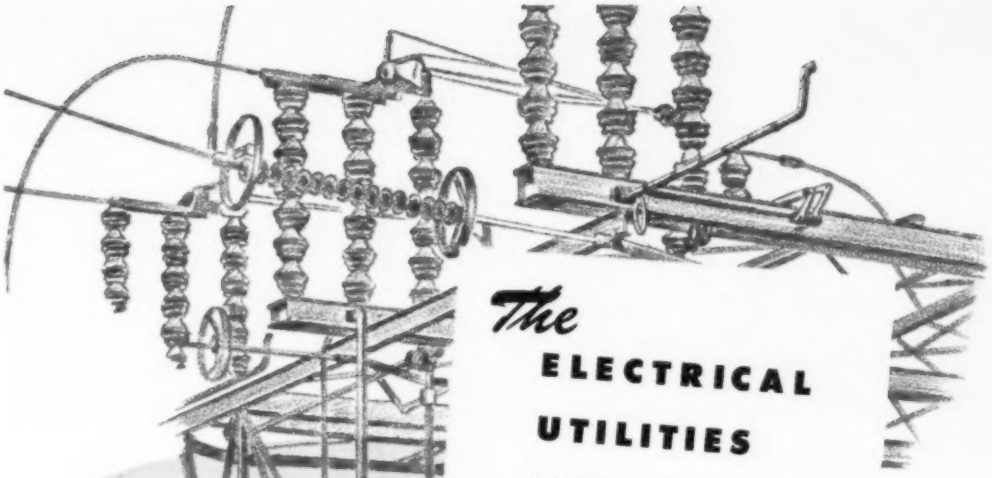
6. Dielectric constant increases with moisture content and with rank of coal. In this respect, there is no great difference between pulverized and monolithic coal.

Besides having over 150,000,000 tons of silt and bone coal stored in refuse banks and elsewhere, the anthracite industry now is producing about 6,000,000 tons per year of low-cost fuel suitable for making synthesis or fuel gas, declared Dr. R. C. Johnson, vice president, Anthracite Institute, second speaker at the Thursday session. Using this fuel would require no new mines, no increased production by present mines and no new preparation plants, he said.

Citing tests conducted by Pennsylvania State College engineers and private industry, Dr. Johnson reported that rice and barley anthracite with oxygen in a Galusha producer has turned out an excellent producer gas at a cost only slightly above that of natural gas at the well and with several advantages over competing fuels. However, he contended, the big promise for anthracite is in the possible use of bone and silt, now being produced in the following proportions of silt to prepared coal:

Eastern middle field	15 %
Wyoming Valley	5 %
Western middle field	14.1%
Southern field	17.7%

With current silt and bone produc-



The

ELECTRICAL UTILITIES USE MORE PREPARED COAL EVERY YEAR...

Electric utilities in the United States used over 89 million tons of coal during 1947. This figure rose to 94.7 million tons in 1948—and estimates based on expansion now in progress show that annual requirements of the electric utilities industry will pass the hundred million ton mark.

DOES YOUR COAL QUALIFY FOR THIS GROWING MARKET?

FAIRMONT, located in the heart of the Appalachian coal fields, "lives with coal."

A large percentage of these millions of tons of coal must, of absolute necessity, be scientifically *prepared* coal. Smart planners will take steps now to make sure of a favorable position in this profitable market. If you'd like the advice of experts on preparation methods and equipment best suited to your coal, call on the FAIRMONT ENGINEERS. FAIRMONT designs and builds complete coal preparation systems . . . Chance Sand Flotation Process for Wet Cleaning and American Pneumatic Separator for Dry Cleaning.

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Designers and Constructors of Chance Sand Flotation Process for Wet Cleaning and American Pneumatic Separator for Dry Cleaning

Simple as pinching a rubber tube

A GRINNELL-SAUNDERS DIAPHRAGM VALVE works on a simple principle . . . it pinches tight for positive closure and opens wide for streamlined flow. The working parts of the valve are completely isolated from the fluid . . . no corrosion, no contamination and no leaks. Choice of diaphragm material. Body materials . . . cast iron, malleable iron, bronze, aluminum, stainless steel. Body linings . . . glass, lead, rubber or synthetics.

NO METAL-TO-METAL SEAT . . . The large contact area on which this flexible diaphragm seats gives positive closure even when grit, scale or other solid matter is temporarily trapped.

MINIMUM RESISTANCE TO FLOW . . . Smooth streamlined fluid passage without pockets prevents accumulation of sludge and reduces friction resistance to a minimum.

MAINTENANCE REDUCED . . . The diaphragm is the only part that normally wears out. Replaced in a few minutes without removing valve from line.

Available in various combinations of valve bodies and operating mechanisms.

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MEETINGS

- American Coal Sales Association: annual convention, June 9-11, The Greenbrier, White Sulphur Springs, W. Va.
- Mine Inspectors Institute of America: annual meeting, June 12-15, Pittsburgh, Pa.
- Big Sandy-Elkhorn Coal Operators' Association: annual meeting June 10, Hotel Phoenix, Lexington, Ky.
- Stoker Manufacturers' Association: annual meeting, June 13-14, French Lick Springs, Ind.
- Colorado & New Mexico Coal Operators' Association: annual meeting, June 15, Boston Bldg., Denver, Colo.
- West Virginia Coal Mining Institute: spring meeting, June 17-18, Prichard Hotel, Huntington, W. Va.
- Rocky Mountain Coal Mining Institute: spring meeting, June 27-29, Colorado Hotel, Glenwood Springs, Colo.
- Mining Society of Nova Scotia: annual meeting, July 11-12, Halifax, N. S., Can.

tion and with vast reserves stored in banks, a large synthetic liquid fuels industry or synthetic chemicals industry could be established in any of the four fields with assured fuel for many years ahead, Dr. Johnson said. The weighted average ash content of this silt ranges from 20% to 32%, volatile matter from 3% to 8%, sulfur below 1% and moisture between 15% and 20%. Dr. Johnson envisioned hydraulic mining of bone and silt, conveying the silt by water through pipelines to a central disposal and recovery plant, recovery of the silt in settling tanks and, after briquetting or pelletizing, reacting the silt in conventional gas generators.

"Too many of us still look for mechanical miracles to accomplish what must first be attained by our own resourcefulness and hard work," warned J. H. Simpson, vice president, Electric Furnaceman, who was lead-off speaker at the second session Thursday afternoon, Frank G. Fry, general sales agent, The M. A. Hanna Co., presiding.

"The Anthratube is a fine piece of equipment but we still have to sell it," Mr. Simpson continued. Equipment dealers who had a good year in 1948 owe it to conversion stokers that have been in service for 20 years and more —equipment which still is doing a good job and is waiting to be sold in the volume which its quality and its fuel deserve, he argued.

Citing moves made by anthracite producers to boost sales of anthracite and anthracite burning equipment, Mr. Simpson reviewed the program set up by The Hudson Coal Co. to increase equipment sales by promotion of steam-size domestic burning equip-

CONTROL COAL DUST with Pangborn Dust Control

PANGBORN Dust Control Equipment gives you:

- **efficient coal dust disposal and reclamation**
- **increased safety**
- **improved working conditions**
- **lower equipment maintenance cost**
- **decreased dust nuisance**

In scores of coal preparation plants, Pangborn Dust Control installations have paid off over and over again by improving working conditions, eliminating dust nuisances, cutting maintenance costs, doing a superior job of dust disposal and reclamation. By effectively collecting the fine coal dust produced in the operation of tipples, dry cleaning, de-dusting and other preparation facilities, Pangborn has become a by-word for making profit-stealing coal dust *behave*.

Whatever your dust problem—high machinery maintenance, nuisance, lost profits through faulty reclamation—Pangborn engineers can help you with an economical and effective solution. Let us make a *dust pocket survey* for you. No obligation—but with the information it gives us, we can recommend the right Pangborn Dust Control Equipment to rid your plant of dust hazards and nuisances.

Write for Bulletin 909A, "The Control of Industrial Dust." PANGBORN CORPORATION, 288 Pangborn Blvd., Hagerstown, Md.

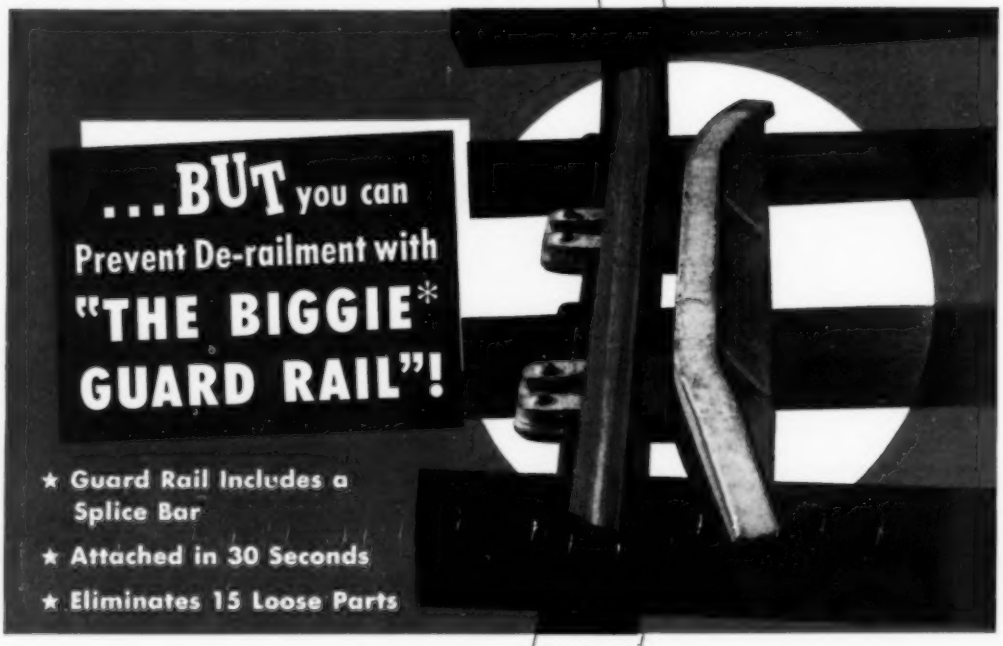
Look to Pangborn for all the latest developments in Dust Control and Blast Cleaning Equipment.

STOP THE DUST HOG from stealing profits with

Pangborn

DUST CONTROL

You Can't Haul Coal With De-railed Equipment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"THE BIGGIE* GUARD RAIL"!
★ Guard Rail Includes a Splice Bar
★ Attached in 30 Seconds
★ Eliminates 15 Loose Parts

The Biggie Guard Rail is made from one piece alloy steel for continuous or intermittent duty at points of most frequent de-railment, as Frogs, Switches and short turns. Its rugged construction prevents turning over or twisting out—it will stay in place for the life of the switch.

The Biggie Guard Rail includes a Splice Bar. Used as a temporary Splice Bar, it prevents break in the cycle of mechanical loading.

The Biggie Guard Rail can be positively attached or detached in 30 seconds. No punching, drilling, holding or special tools are required—ideally suited to prefabricated track.

The Biggie Guard Rail eliminates Bolts, Spacers or any other obstruction to Wheel Flanges. This not only reduces Wheel breakage, Axle and Bearing failure, but eliminates 15 loose parts used in the costly installation of conventional Guard Rail.

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GENUINE MMP Parts TRADE MARK

EQUIPMENT APPROVALS

Five approvals of permissible equipment were issued by the U. S. Bureau of Mines in April, as follows:

Ingersoll-Rand Co.—Type D-48303 air compressor; one motor, 30 hp, 250 volts dc; Approval No. 2-664; April 7.

Joy Mfg. Co. (Sullivan Div.)—Type CHL and Type CHD car-spotting hoists; one motor on each, 5 and 10 hp, respectively, 250 volts dc; Approval No. 2-665; April 21.

Joy Mfg. Co.—Type 3JCM-2E/F continuous miner; seven motors, two 65 hp, three 7½ hp and two 5 hp, 250 or 500 volts dc; Approvals Nos. 2-666 and 2-666A; April 26.

Thomas A. Edison, Inc.—Model R-4 electric cap lamp; Approval No. 29; April 22.

Mine Safety Appliances Co.—10-shot blasting unit; Approval No. 1607; April 29.

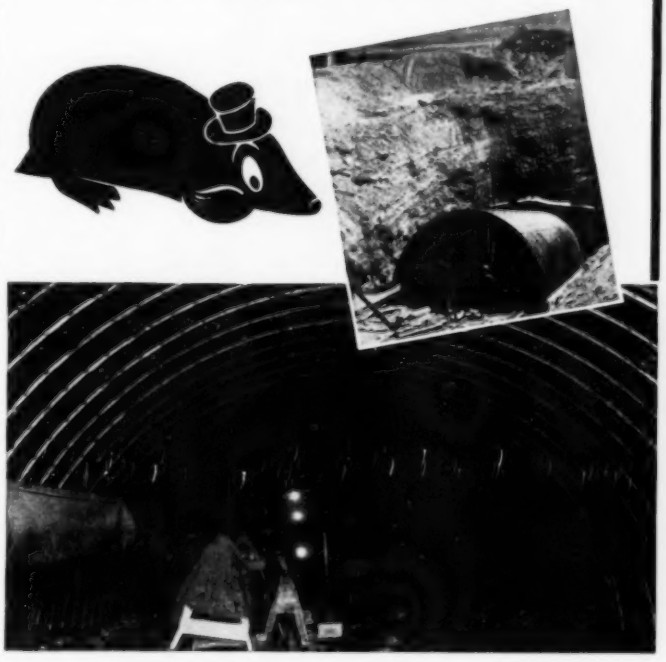
ment, employment and education of personnel for this purpose, using this personnel to promote dealer sales and encouraging some of these trained men to become dealers themselves. Mr. Simpson urged an industry-wide policy similar to that of The Hudson Coal Co. "to transmit the will of the industry down through its organization by methods already tried and proved." The big needs, he concluded, are a will to sell, the ability to cooperate at all levels and a sales staff sufficient to tell the story.

"Careful planning does influence the acceptability of solid fuel for residential heating," declared R. A. Jones, research associate professor of architecture, University of Illinois, who reviewed the steps taken by his organization, in cooperation with the Anthracite Institute, Bituminous Coal Research, Inc., and American Coke & Coal Chemicals Institute to inform home builders, owners and architects on ways to plan for coal heat. Observing that a man who builds homes for sale is interested primarily in first cost (the heating unit itself, controls, installation and related equipment and structure), Mr. Jones quoted current forced warm-air heating-plant costs in the Urbana, Ill., area as follows:

Gas-fired furnace	$ 500
Oil furnace with pressure burner, including tank	670
Coal-fired furnace, including bin and stoker	1,205

With these figures before him, Mr. Jones pointed out, the building naturally installs gas or oil, ignoring the probability that the annual fuel bill will be over twice the cost of coal heat. Mr. Jones reported that these facts

these liner plates would "Open a Mole's Eyes"



Even a mole takes a back seat when you tunnel with ARMCO Liner Plates.

And no wonder. Experienced mining men have long known the savings in time, work and money that ARMCO Liner Plates bring to even the most difficult jobs. These plates are light in weight and easy to handle. A single, unskilled workman can carry, hold and bolt into place an ARMCO Liner Section. Only a structural wrench is needed. Installation goes fast and labor costs are low.

You'll find ARMCO Liner Plates the easy, economical way to construct sloped or vertical entries, escapeways, air shafts, substations, overcasts and other installations. There is a wide range of diameters and gages to meet your needs.

ARMCO Liner Plates provide exceptional durability and safety from fire hazards. Corrugated metal design gives them ample strength to meet mining requirements. Write for complete information. Armco Drainage & Metal Products, Inc., 2075 Curtis Street, Middletown, Ohio.

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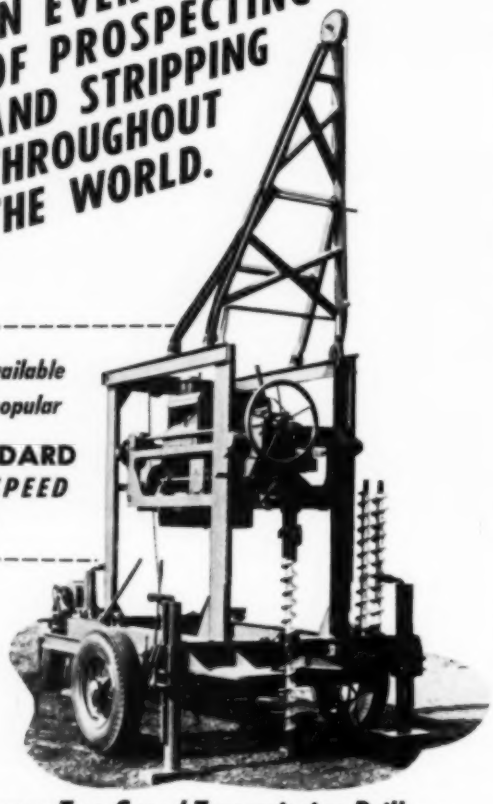
ARMCO TUNNEL LINER PLATES

8 YEARS DEVELOPMENT

ON FIELD TESTS IN EVERY TYPE OF PROSPECTING AND STRIPPING THROUGHOUT THE WORLD.



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STANDARD *ONE-SPEED* DRILL

The Parmanco Two-Speed Transmission Drill is designed to meet the requirements of the general prospecting field where it is not necessary to drill in solid limestone. Special sliding frame permits drilling and pulling of augers without moving drill. New design of chuck eliminates all hand operation in raising power plant. Recommended for 50 to 60 feet with four and one-quarter to four and one-half inch equipment. Under favorable conditions it is being used to greater depths and can be used with six-inch equipment.

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PARIS, ILLINOIS

are being made known to architects and prospective home owners through the Small Homes Council of University of Illinois and related agencies. Meanwhile, he urged, the industry can improve the outlook for domestic use of coal by improving delivery methods. Architecturally, the problem can be approached by better planning of delivery chutes, bins and driveways, more convenient access to basement and storage areas and improved ways of storing and removing ashes.

J. D. Jillson, secretary, Anthracite Institute, reviewed factors affecting anthracite markets in 1948 and ventured some forecasts for the year ahead, as follows:

Weather—As of March 27, 1949, in New Yori City, there was a deficiency of 920 degree-days as compared with 1947-48 and 815 degree-days as compared with normal. With losses rated at 8,060 tons per degree-day, this deficiency represents 7,146,000 tons under 1947-48.

National income—Anthracite prospered with high national income in 1948. A possible leveling-off in 1949 will not seriously affect the industry. In view of the warm winter just past, it may be difficult to persuade consumers to fill their bins in spring and summer, 1949.

Increases in population and families—In the anthracite market area, population increased 1.7% in 1948. In the period 1945-47, new families increased 499,000 per year, against 347,000 in 1937-39. The outlook for continued residential building is good.

Employment—Employment set a new high record in 1948 and, though tapering off, will remain high in 1949.

Occupancy of existing dwellings—Occupancy is practically 100% in anthracite's marketing area. There are estimated to be 10,722,000 dwelling units in the market area, with a potential demand for 95,695,000 tons of anthracite.

New housing—In the anthracite market area, 216,000 new dwelling units were built in 1948 with potential demand for 1,500,000 tons. It is estimated that 15% of these will use anthracite, thus adding some 277,000 tons to demand. Some slacking off in the building rate is expected in 1949.

Competitive fuels—Buckwheat and rice maintained their price advantage over No. 2 fuel oil but price cuts on No. 6 oil whittled down the advantage of anthracite steam sizes. Coke sales fell in 1948, as did residual oil sales. The saturation point is being reached in the range-oil market. New smoke laws have increased some anthracite markets at the expense of bituminous. It is estimated that mixed and manufactured gas won not over 83,000 new users in the anthracite area in 1948, including perhaps 16,600 former anthracite users. Natural gas is being admitted slowly to anthracite's market area, mostly as an enriching agent for manufactured gas. Bootleg anthracite probably increased about 200,000 tons over 1947 to a total

TELSMITH
more economical feeders

MARMET COAL CO., MARMET, WEST VIRGINIA—36-in. x 6-ft. Telsmith Standard-Duty Plate Feeder delivers 200 tons hourly of mine run coal.

● Keep your conveyors, screens and crushers working smoothly and at full capacity. Telsmith Apron or Plate Feeders insure steady, uniformly regulated flow of material to entire plant—boost your output and cut cost of up-keep.

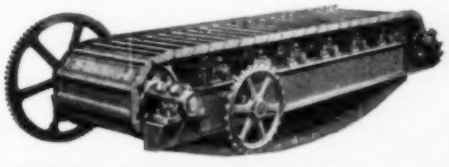
APRON FEEDERS are self-contained units on heavy structural steel frames. **Heavy-Duty Apron Feeders**—with carbon, or manganese steel flights—handle the toughest jobs, such as feeding primary crushers, either jaw or gyratory. **Standard-Duty Apron Feeders**—equally sturdy, but weigh less. Apron Feeders are made in 24-in. to 72-in. widths, with capacities from 25 to 700 tons per hour. Furnished with heavy steel hoppers, at extra cost.

PLATE FEEDERS are simple in design—sturdy in construction. Adjustable stroke regulates capacity. Made in both Standard and Heavy-Duty models; widths 16-in. to 48-in.; capacities 12 to 400 cu. yds. per hr.

Send for Bulletin F-66

F-1.

TELSMITH Standard PLATE FEEDER with special back gear shaft and drive pulley equipment at extra cost.



TELSMITH Standard-Duty APRON FEEDER—Raised edges of its ⅜-in. steel flights prevent spillage.

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MONEY!...TIME!...LABOR!...
ON YOUR PIPING SYSTEMS

VICTAULIC COUPLINGS and VICTAULIC *FULL FLOW* Elbows, Tees, and other Fittings . . . add flexibility to any piping system . . . allow pipe lines to follow any construction design or land contours . . . No costly engineering problems.

SIMPLE INSTALLATION . . . of Victaulic Couplings and Fittings is assured . . . Quick, dependable two-bolt construction permits pipe lines to be assembled without trained labor . . . a standard T-wrench is the only tool required for connections. Repairs or changes in the piping system are simple . . . no backing off of adjoining sections is necessary.

VICTAULIC INSTALLATIONS . . . have a sealed union at every joint and fitting . . . leak tight under pressure or vacuum . . . positive locked . . . no costly, dangerous pull outs or blow offs under vibration, sag, or torque.

YOUR PIPING COSTS can be kept at a minimum with a VICTAULIC SYSTEM.

EASY-TO-USE "VIC-GROOVER" . . . grooves pipe ends automatically, twice as fast, with half the effort of a conventional pipe threader . . .

WRITE TODAY for these two: Victaulic Catalog and Engineering Manual No. 44 . . . "Vic-Groover" Catalog No. VG-47.

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of 1,839,000 tons but probably will decline in 1949.

European exports—Total of 1,662,000 tons, down about 1,300,000 tons from 1947-48.

Canadian markets—Total of 5,082,483 tons, the second highest year on record. Foreign anthracite competition is not likely to continue in 1949.

Lake States market—Steady increase in 1949.

Equipment development and research—Sales of anthracite stokers were up from 3,755 in 1947 to 10,265 in 1948, plus about 1,500 Anthratubes. Prospects are good for 1949.

New uses for anthracite—Research advanced on fluidized-bed gasification to make fuel and synthesis gas from silt and on making carbon disulfide from sulfur dioxide and oxygen.

Advertising program—Results were shown in higher morale in the industry, a successful summer fill-up campaign in 1948 and a slow-down in the sale of competitive heating equipment.

Industrial uses of anthracite—Industrial use is estimated at 6,000,000 tons in 1948, mostly for electric power and gas utilities; railroad use down.

Inventories—Dealers should try to accept one-twelfth of their total annual requirements to keep the industry operating on an even keel. In this respect, 1948 was a successful year.

The performance of anthracite fine-coal cleaning plants was discussed by J. D. Clendenin, Pennsylvania State College, in the first paper at the Thursday evening session. Cadwallader Evans Jr., president, The Hudson Coal Co., presided.

Interest in the performance of fine-coal cleaning plants has been spurred by four developments, Mr. Clendenin said: (1) increasing demand for recovery of silt, (2) the growing market for fine sizes, (3) the realization that recovery by present methods is comparatively low and (4) lack of information on routine performance and recovery of existing plants.

Procedures for determining plant performance involve measurement of coal recovery, measurement of combustible recovery and sampling, Mr. Clendenin pointed out. Of the two ways of measuring coal recovery, the ash-balance method is preferred to the weight method because it requires nothing more than a routine collection of suitable samples of feed, product and refuse whereas the weight method requires complex handling of materials and is subject to all the errors of sampling. Tests have shown that there is no substantial difference in results obtained by the two methods. Measurement of combustible recovery is not satisfactory measure of ultimate recovery nor is it a substitute for float-and-sink efficiency tests.

Sampling, Mr. Clendenin contended, is the most important phase of any program to check plant performance, since the worth of the results depends entirely on whether the sample really represents the material to be tested. Two sampling procedures are used in

16-CAR TRIP *Dumped* in 80 seconds!

Inside the mine, the loaders can't be kept waiting...every second counts—and *costs!*

Automatically unloaded without stopping, this whole trip of A.C.F. Drop-Bottom-Mine Cars is ready to start back to the mine in just one minute and twenty seconds! "Lubricated" doors unlatch, dump, and latch, automatically, in motion ...unload a 5-ton car every five seconds! No wonder A.C.F. Drop Bottom Cars up coal output...Our Sales Representatives will be glad to show you how a change-over to A.C.F. Mine Cars will raise production and lower costs in your mine.

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IT'S FAST! IT'S POWERFUL! IT'S ECONOMICAL!

Here's the new all-electric version of the MARION 111-M, a 6 cubic yard coal loader that's setting production records across the country. It's a blend of speed, power and economy that gets big jobs done quickly. Delivery dates?—earlier than you might think. Why not check your nearest MARION District office or agent today?

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"Give us the tools . . ."

The 81st Congress Can Halt the Administration's *SOCIALIST PROGRAM*

In his speech at Massachusetts Institute of Technology, Winston Churchill said that America's possession of the atomic bomb is all that has kept Soviet Russia from overrunning Europe and bombing London.

Our State Department knows that there has been another deterrent to aggressive warfare by Russia and a deciding one. That deterrent is the superior industrial strength of the United States. But once Russia approaches our industrial strength, then watch out! For Stalin or no Stalin, there will be trouble. Therefore, the simple table below is worth every American's careful reading. It shows in percentages what Russia did with her national income in 1948 and what we did with ours:

	USSR	USA
Civilian use	60%	79%
New capital equipment and public works	21%	12%
Foreign aid		2%
Defense	13%	5%
Building of inventories and war stock-piling	6%	2%

These figures for Russia come from *The* (London) *Economist*, Britain's influential economic journal.

These figures are estimates based on information from behind the Iron Curtain, and so cannot be checked directly. But they fit with what is known of Russian development.

The table shows that Russia is straining every resource to build up its industrial strength. When Russia's effort is measured in *dollars*, and compared to ours, the figures show:

Where we spent $20 to $21 billion for new industrial plants and equipment last year, the Russians spent $12 to $14 billion.

But while we used about $9 billion of this to *replace* old equipment, the Russians spent no more than $2 billion for replacing old equipment. The Russians had much less worn-out and obsolete equipment to replace. They could concentrate their efforts on expanding their industries and buying new equipment.

So—we used only $11 to $12 billion to *expand* our industries.

And the Russians used almost as much to expand theirs—$10 to $12 billion.

Russia is gaining industrial strength as fast as we are—and may soon be gaining faster. The more she gains and the faster she gains on us, the greater is the danger of war.

continued on next page

American industry is pushing modernization and expansion hard. It is doing an heroic job. McGraw-Hill's recent survey* shows that *industry* already has in hand plans to build plants and buy equipment in the next five years adding up to $55 billion. Industry plans that investment—*and much more—if it can get the money.*

On those plans of *industry* depend *our* national security.

If these plans of ours are cut back, the Russians will be years closer to their goal of industrial equality—the strength that they need to wage aggressive war successfully.

But more and more our industry's plans are being menaced by socialist policies in Washington. The President continues to urge a further increase in the tax on corporate profits, even though federal taxes alone now take 38 cents of every dollar of profit. He wants $3 billion more in taxes on corporate profits now, plus added personal taxes.

Last year corporations spent almost two-thirds of their profits—about $13 billion—for new plant and equipment. This year corporation profits will be lower than last year's $21 billion, perhaps by 20 per cent. Subtract a fifth or more from last year's profits. Then adopt the President's proposal and take $3 billion more in corporate taxes and you raise havoc with planned expenditures for new plant and equipment.

Approval by Congress of the President's tax program would cut industry's program of plant and equipment development by a third or more. That means a major blow to our prosperity as well as our national security. For as capital investment goes, so goes general prosperity.

Further serious damage would be done by Congressional approval of the President's industry-control bill. The so-called Stability Act of 1949 (the Spence Bill) would severely check industrial progress. That bill would put the federal government in the business of providing the added industrial capacity which the tax program would prevent private industry from doing for itself. It would be hard to conceive a better and surer way to dry up private investment in new plant and equipment. For every dollar of government investment will scare away many times more dollars of private investment. People will not want to risk their money in businesses competing with the U. S. Treasury. At the same time it will attack private investment in another way. It means that government would spend your income for you instead of allowing you to spend or invest for yourself. That is the high and quick road to socialism.

American industry needs right now great courage and incentives if it is to carry out its tremendous building program. It needs also a release from the program of a socialist administration in Washington with its systematic discouragement of enterprise and risk taking.

Above all, industry needs assurance by the actions of the 81st Congress itself that there is a future in this country for a system of dynamic capitalism, functioning in a free society. By acting now to strengthen the American people's faith in their industrial system, by providing needed incentives for management and investors, by protecting industry's capacity to buy new equipment, the 81st Congress can sustain American industrial progress and keep us united and strong.

But if we kill freedom of industrial planning and action by unneeded taxes and government controls we put ourselves—and our friends all over the world—in dire peril.

Nothing would please the Communists more.

James H. McGraw, Jr.

President, McGraw-Hill Publishing Company, Inc.

***A complete report on our national survey may be obtained by writing McGraw-Hill Publishing Co., 330 West 42nd St., New York 18, N. Y. This is one of a special series of editorials on industry's needs for new plants and equipment.**

anthracite fine-coal plants: (1) grab samples of the flow of pulp or coal, a method which is subject to considerable error, and (2) slicer sampling, which catches a representative cross-section.

There is a real need for frequent on-the-spot checks or control tests of plant performance to prevent loss of marketable coal, Mr. Clendenin stated. These tests fall generally into two groups: (1) direct methods, including float-and-sink and ash-content analysis, the accuracy of which depends on the reliability of samples and characteristic deviations of the material; and (2) indirect methods, including measuring pulp density and hand screening. Where percent solids in the feed pulp is significant in fine-coal preparation, pulp density should be used as an aid in control. However, use of a simple hand-screening test, except as a check on broken or worn equipment, is of little significance unless the natural variability of the percent cumulative size is carefully established.

Dust control underground protects the health of workers, boosts production, increases visibility and reduces accidents, said R. E. Doherty, dust control engineer, Anthracite Institute, who also reported that 75% of anthracite producing companies now are using various methods to keep dust down. The big problem is getting water to the working places and keeping the pressure right, he declared. Methods now used include: (1) piping water from upper levels, where pools of water sometimes are located, (2) building water-storage dams underground, (3) piping fresh water from the surface and (4) transporting water in tank cars.

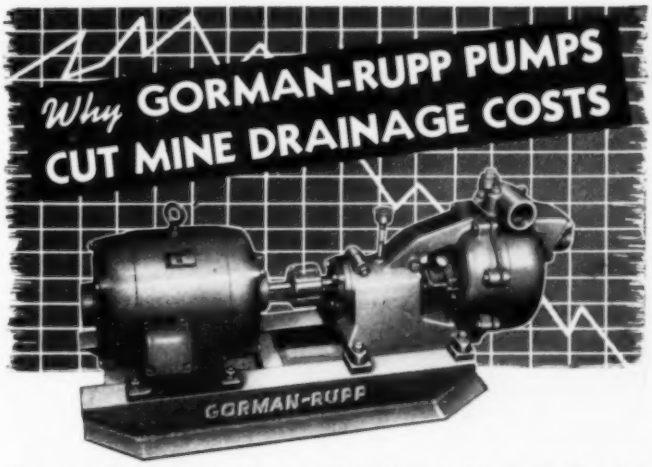
Since electrical precipitation of dust is too expensive and fog sprays reduce visibility, the best method is to wet the dust at its source, Mr. Doherty stated. Among other methods, the wet-type jackhammer is being widely used with great success. In addition, since 90% of dust rising at the time of blasting is caused not by fracturing of coal but by the effect of concussion on settled dust, spraying for 30 seconds has been found to consolidate the settled dust and reduce after-blasting dust as much as 91%. Recent developments indicating wider use of dust-control methods are these: (1) all rock development tunnels now are being driven by wet methods, (2) with steel pipe now easier to obtain, water lines are being extended, thus reducing the number of tank cars being used; and (3) workers are openly protesting against dusty working places.

Mr. Doherty's recommendations for reducing dust included the following:

1. Use wet-type jackhammers, which, by the way, increase drilling speed up to 38%.

2. Spray face, ribs and bottom before firing.

3. Spray after firing to drive out smoke and gas and settle dust on



Gorman-Rupp Self-priming, Centrifugal Mine Gathering Pumps are engineered to meet exacting mine requirements.

LOWEST FIRST COST You get more for your money when you buy Gorman-Rupp Mine Pumps. They maintain nearly normal capacity under any working head. Frictional loss and increased lifts do not greatly affect their efficiency. Smaller capacity Gorman-Rupp pumps can often be used where larger, more expensive units of other makes would otherwise be required.

COSTS LESS TO MAINTAIN Absolute simplicity - only one moving part, the impeller. Wearing parts quickly and economically replaced with common tools.

NO COSTLY SHUTDOWNS Absolutely dependable - run indefinitely without shutdown requiring little or no attention. Sand, muck or solids that will pass the intake strainer will not clog or harm these pumps. Automatic priming--ideal for remote location and control.

LOW HEAD ROOM Gorman-Rupp design permits very small headroom - from 13½ to 21¼ inches depending upon size (pump only). Available in capacities from 50 to 200 GPM and heads up to 125 feet.

SPECIAL ALLOYS Pumps are built of three different metals to meet various mine water requirements.

GUARANTEED every Gorman-Rupp pump carries the maker's positive guarantee. Inquiries invited: ask for Mine Bulletin No.301-46.

Check **THIS LIST FOR YOUR NEAREST GORMAN-RUPP DISTRIBUTOR**

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Greenville Supply Co., Greenville, Ky.
General Machinery Co., Birmingham, Ala.
Superior Sterling Co., Bluefield, W. Va.
Athens Armature & Machinery Co., Athens, Ohio.
Tennessee Mill & Mine Supply Co., Knoxville, Tenn.
Mine Service Co., Lothair, Ky.
Reliable Electric Co., Zanesville, O.
Cambridge Mach. & Supply Co., Cambridge, Ohio.
Medico Elec. Motor Co., Pittston, Pa.
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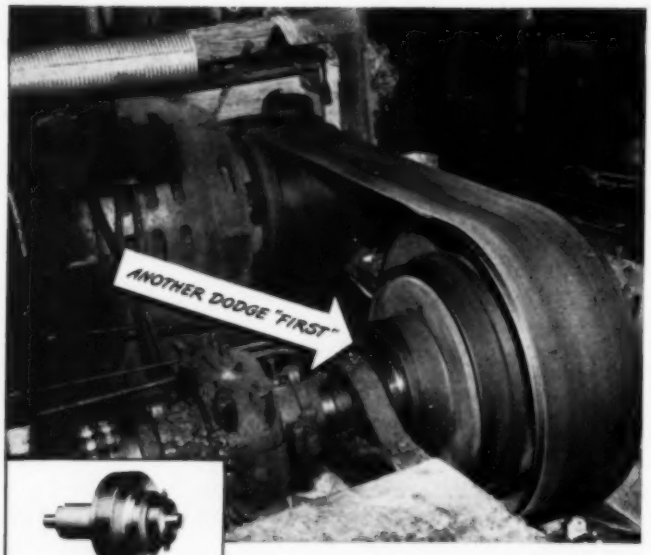
THE GORMAN-RUPP COMPANY
305 BOWMAN STREET, MANSFIELD, OHIO



Over 50 years of experience in the manufacture of industrial clutches have gone into development of rugged Dodge Diamond D Friction Clutches.

"SHOCK" TROUBLE?

Here's one way to lick it!

Here a Dodge Diamond D Clutch takes the tremendous shock loads of a veneer peeler lathe. Huge logs are revolved and "peeled" by knives, with 150 to 200 engagements per hour! Precision-built clutches, capable of performing dependably where profits depend upon uninterrupted operation, are another Dodge "first."

For information on how Dodge products can improve machine performance, save power and keep production steady, call the Transmissioneer, your local Dodge Distributor. He has news on latest developments in the field of power transmission machinery.

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TAPER-LOCK SHEAVE
Simplest, surest mechanism ever devised for bolting wheels to shafts.

DODGE-TIMKEN BEARINGS
save power on millions of industry's toughest jobs.

ROLLING GRIP CLUTCH
No toggles! Compact. Extreme flexibility with positive drive.

FIRST IN POWER TRANSMISSION MACHINERY!

DODGE
of Mishawaka, Ind.

CALL THE TRANSMISSIONEER—graduate of a Dodge factory course, qualified to help on your power transmission problems. Look for his name under "Power Transmission Equipment" in your classified telephone directory.

NAME PLATES

FOR YOUR NAME PLATE REQUIREMENTS, WRITE OUR SUBSIDIARY, ETCHING COMPANY OF AMERICA, 1520 MONTANA STREET, CHICAGO 14, ILLINOIS

loose coal to permit dust-free loading.

4. Permit some spillage of damp coal in haulage to eliminate dry, dusty haulageways.

5. In pitch mining, where breasts are worked empty on pitches up to 40 deg, hold the loose coal near the face after blasting by pole or plank batteries until it is sprayed. Then, after saturation, permit the wet coal to run down to the check battery at the gangway.

The results of dust control, Mr. Doherty concluded, are better health among miners, better working conditions, increased productivity, better morale, lower labor turnover, fewer mine fires because water is available and lower accident rates because of improved visibility.

Reviewing the growth in use of undercutters, scraper-loaders, longwall chain conveyors, track-mounted shoveling machines and mucking machines in the early period of anthracite mining, J. W. Buch, supervising engineer, Anthracite Mechanical Mining Section, U. S. Bureau of Mines, traced more recent developments in anthracite mine mechanization. There have been no major loading-equipment developments to meet anthracite conditions since the V-type scraper was introduced and the use of bituminous-developed machines has gone about as far as possible, he pointed out. Developments for anthracite mining have been hindered by the competition among big equipment manufacturers for the bituminous market and by the lack of capital for research and development among small manufacturers.

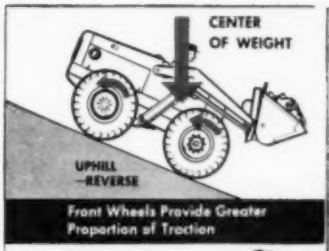
Mr. Buch pointed out that the anthracite industry needs machines to serve its peculiar conditions. To meet these needs, the Bureau now is studying new designs under an appropriation voted by Congress in 1945. These studies include the following:

1. Design, construction and testing of a combination scraper-shaker loader for driving gangways in thin, steeply pitching beds. The machine has passed through initial tests and, following minor design changes, now is being tested again. Maximum loading rate is estimated at 150 tons of material per hour.

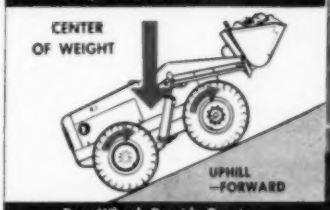
2. Testing of light-weight air-powered shearing machines, developed in Germany and weighing 1,600 and 3,000 lb respectively, for driving development gangways and monkey airways. It is believed these machines can double the present rate of development.

3. A change in face timbering methods, in conjunction with greater speed of shearing, to increase development speed four-fold. One idea, still in the drawing-board stage, is to use a telescoping tunnel-shield type of face support, operated hydraulically, with a timbering being done behind the shield by a separate crew using metal frame supports. On retreat, these supports could be recovered.

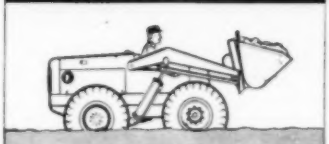
4. Although thin seams, steep pitches and other difficulties may bar



Front Wheels Provide Greater Proportion of Traction

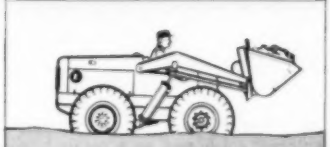


Rear Wheels Provide Greater Proportion of Traction



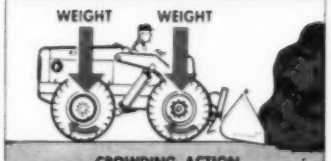
MUD

All Wheels Provide Traction



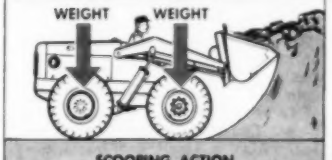
SAND

All Wheels Provide Traction



CROWDING ACTION

More Traction At Rear When Thrusting Into Pile



SCOOPING ACTION

More Traction At Front When Scooping Up Load

with 4 Wheel Drive!

The Model HM Payloader is a profitable new tractor shovel for both open pit and underground mines. Its large pneumatic tires permit operation on coal veins without chopping and grinding the coal. It will dig, load, bulldoze, grade, carry, lift and push.

This big, powerful, 1½ yd. Payloader has tremendous digging power and ground-gripping traction for tough going in rock, sand, muck or *any* terrain. Four-wheel drive on large rubber tires provides traction comparable to a crawler tractor—plus more speed, greater mobility and *far less maintenance expense.*

It has power-boosted steering, four forward speeds up to 16 mph, four reverse speeds and quick-acting forward-reverse control combined for easy operation and fast maneuvering. It has double-acting hydraulic rams that raise, lower, dump and close the bucket. Get the complete story on this efficient, new Payloader from The Frank G. Hough Co., 735 Sunnyside Ave., Libertyville, Ill.

CLEANS TOPS OF VEINS
FEEDS STRIPPING SHOVELS
LOADS TRUCKS
MAINTAINS ROADS
MOVES TOOLS AND SUPPLIES
LIFTS, PUSHES, CARRIES

WRITE for full information on any size of Payloader: the 1½ yd. Model HM; the 1¼ yd. Model HL; the ¾ yd. Model HF; the 10½ cu. ft. Model HA.

HOUGH
PAYLOADER
Manufactured by THE FRANK G. HOUGH CO.

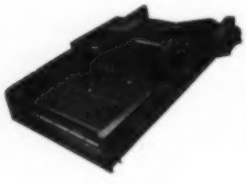
There May be "ACRES of DIAMONDS" in *Your* Back Yard

This is the table you saw in Booth 309 at the Coal Show—the ONLY table displayed.

Culm banks, river deposits and so-called "waste" piles may represent thousands of dollars "in the rough." Progressive mine operators have discovered that it often pays to re-process these materials with Super-Duty Coal Washing Tables. Recoveries, in many cases, are extremely profitable.

So efficient is the SuperDuty that it is not uncommon to see it installed specifically for re-processing purposes.

As original processing equipment it is unexcelled in coal washing for the maximum removal of ash and sulphur at unusually high recovery of float coal. For full information, write for Bulletin 119.



FOR SCREENING ECONOMY

The Leahy Vibrating Screen possesses an uncanny ability to do a job right—and in record time. It screens wet or dry, using screen cloth or perforated plate. Excellent for fine mesh screening, dewatering or desanding. Range from 2" to finest mesh. Ask for Bulletin 14-H.

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wide use of the continuous miner, the Bureau is about ready to start tests of a coal planer to be used in flat virgin beds 6 ft thick or less. It remains to be seen whether such a machine will plane anthracite.

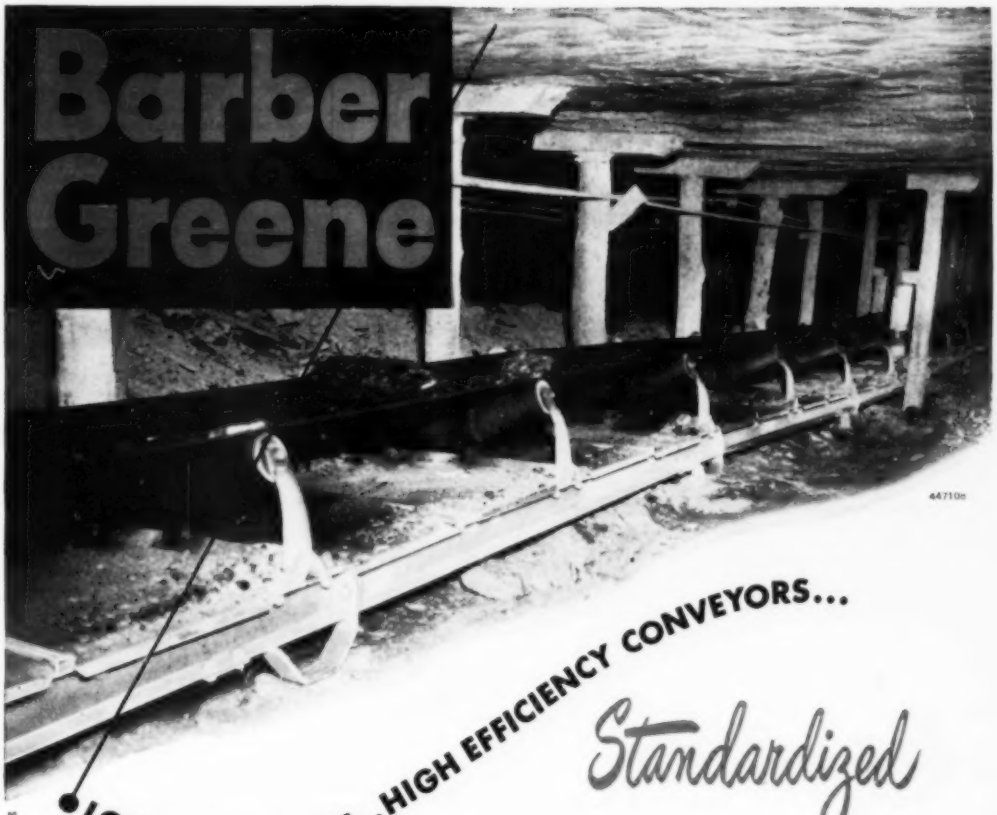
During the war, the Anthracite Institute, working with the Bureau of Mines, found that mixtures of rice anthracite with bituminous could be used successfully under small industrial boilers, thus easing a critical shortage of bituminous in some areas. In addition to easing the strain on fuel supplies, certain unexpected advantages were found, it was pointed out in a joint paper prepared by L. N. Burnside, manager, Equipment Division, and A. A. Norrman, fuel engineer, Delaware, Lackawanna & Western Coal Co. The paper was presented at the Utilization session Friday morning, J. B. Warriner, chairman of the board, Lehigh Navigation Coal Co., presiding.

The results of mixing anthracite and bituminous were high boiler efficiency and reduction in fuel consumption, reduction of smoke and reduction in the manual attention required by boilers and stokers, the authors stated. Adding from 20% up to 50% of rice anthracite solves three problems encountered in the use of straight high-volatile bituminous caking coal—the need for big combustion space and high boiler setting, the need for constant agitation of the fuel bed and the need for large quantities of oxygen to burn volatiles and carbon. In burning a mixture of anthracite and bituminous in stokers, distillation of the volatile matter loosens the anthracite particles, which fall into the openings in the coke trees and burn at high temperature and with great turbulence. In addition, the anthracite ash acts as a catalyst to create a greater affinity of oxygen for the carbon in the volatile matter and thus creates a smokeless combustion.

On traveling-grate stokers, the authors pointed out, substitution of rice for barley or No. 4 buckwheat eliminates fly-ash and thus offsets the added cost of rice. Small hand-fired plants also can use rice instead of bituminous or larger sizes of anthracite by employing full-dumping grates with forced draft and a full system of automatic controls. With limited reserves of low-volatile free-burning bituminous, industrial uses of anthracite rice hold a good deal of promise for the industry, the authors concluded.

Since 1937, over 2,000 anthracite-burning underfeed stokers have been installed, using over 800,000 tons of anthracite rice per year, with capacities ranging from 100 to 1,000 lb per hour and daily operating efficiencies of from 68 to 70%, reported William Stein, Combustion Engineering Co., Inc. Also, a small and inexpensive traveling-grate machine has been developed and marketed recently for burning No. 4 buckwheat and barley under small boilers, with test efficien-

Barber Greene

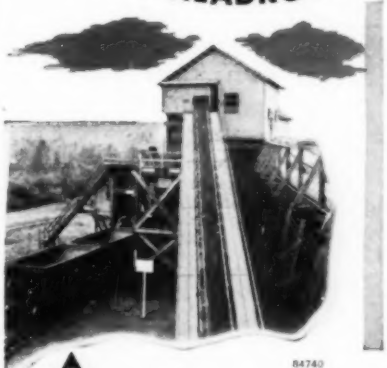


44710B

LOW HEADROOM..HIGH EFFICIENCY CONVEYORS...

Standardized

for easy assembly and relocation



84740

You can cut the cost of getting the coal out of those low seams with simplified, "standardized" B-G channel-frame belt conveyors. These B-G *pre-engineered* underground conveyors come to you clearly marked for quick and easy assembly—are simply disassembled, relocated with a minimum loss of working time. Rugged channel frame has skid legs for low head room mounting on the floor, holds smooth rolling B-G Carriers in true alignment . . . To cut costs now, why not see your B-G Distributor about these widely used mine conveyors?

(Left) Less assembly time, less "blueprint work"—B-G Mine Conveyors (Channel or Truss Frame) with complete accessories—carriers, take-ups, drives, A-frames, etc.—are designed for maximum interchangeability, greatest ease in selection and erection. Assembly-tested at the factory!

BARBER · GREENE COMPANY · AURORA, ILLINOIS

Constant flow Equipment

LOADERS PERMANENT CONVEYORS PORTABLE CONVEYORS COAL MACHINES BITUMINOUS PLANTS FINISHERS DITCHERS

SAFETY SPEED STAMINA

for ALL Mine Jacking

with

SIMPLEX RATCHET LOWERING JACKS

● These rugged, easy operating Simplex Ratchet Lowering Jacks speed mine jacking . . . and insure greater safety. Proved and used in every type of mine, Simplex Jacks can be depended upon to step up efficiency; to cut time and costs on lifting, lowering, leveling and other jacking jobs.

Every Simplex Ratchet Lowering Jack is built to lift full rated capacity on cap or toe. Each guarantees maximum service with these features:

Double lever sockets—Extra strong, adjustable spring mechanism—Shorter Fulcrum centers—Large Trunnion bearings—Reinforced, inner-ribbed housings.

No. 86A—FOR THICK SEAMS
5 Tons capacity—20" high—12" lift. For coal cutting and loading machines, retailing mine cars and light locomotives, shop, track work, etc.

No. 85A—FOR MEDIUM SEAMS
5 Tons capacity—17" high—10" lift. For locations where more limited height and lift are required. Combines maximum strength with minimum weight.

No. 84A—FOR THIN SEAMS
5 Tons capacity—Weighs only 20 lbs.—14" high—7" lift. For easy handling and operation in cramped quarters.

THE COMPLETE SIMPLEX LINE of MINE JACKS
also includes—Mine Timber Jacks, Post Pullers, Hydraulic Jacks, Geared Jacks, and Anchor Jacks. *Send for Bulletin: Mines 47 and Mines 48*

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SIMPLEX MINE ROOF JACKS
Three Types of Heads

"FS" Flat Swivel for use with wooden pieces — as shown on jack at left.
"C" for square and round timbers.
"FB" for small H beams and rails.

SIMPLEX PIN-UP JACKS
Type "FL" Head—flat with lugs.

Simplex LEVER · SCREW · HYDRAULIC Jacks

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cies of about 70%, he added. His recommendations for getting the best service from underfeed stokers included the following: an inexpensive start-stop control; a furnace-draft regulator; a stoker-timer, set at desired intervals, to prevent fuel from burning down into the retort; combustion rates of 18 to 22 lb per square foot for moving grates and 15 to 16 lb for stationary grates; fuel-bed thickness of 4 to 4.5 in, evenly distributed; and adequate draft and sufficient grate area. With increasing pressure for smoke control and with manufacturers of equipment ready and willing to improve their product, Mr. Stein predicted that the use of anthracite and sales of equipment will increase faster than in the past 10 years.

New developments in crossfeed combustion of anthracite were reviewed by Paul A. Mulcey, director, Anthracite Institute Laboratory, final speaker at the utilization session Friday morning. Main advantages of the crossfeed system are economy of space, concentration of discharged ashes and simplicity of construction, he said. Leading up to new developments, Mr. Mulcey summarized earlier crossfeed features incorporated in the Losch boiler, which burns rice, barley and No. 4 buckwheat on a slightly inclined grate fitted with a series of tuyeres; the Westinghouse heat generator, which burns pea, buckwheat and rice on a flat circular grate rotating around a water-cooled column, with tuyeres drilled into the grate; the rectangular retort stoker developed by the Anthracite Institute, featured by a stationary retort and a grate area that can be reduced or enlarged by adding or removing segmental castings; and a combination crossfeed and overfeed incorporated in the Herco Anthratube, in which burning takes place in a U-shaped tube.

More recent investigations and developments summarized by Mr. Mulcey included (1) improvement of the design of the rectangular retort to provide a burning rate of about 10 lb per hour, resulting recently in production of the Fire Chief and the Blue Coal boiler-burner; (2) adaptation of a high-volatile stoker so that it burns anthracite satisfactorily at a rate of 20 to 25 lb per square foot per hour; (3) improvements in the design of a commercial-size direct crossfeed burner, with feed rates of 100 to 400 lb per hour, for use in tobacco curing; and (4) tests on the Ridson stoker indicating that burning rates may be increased by boosting the air flow.

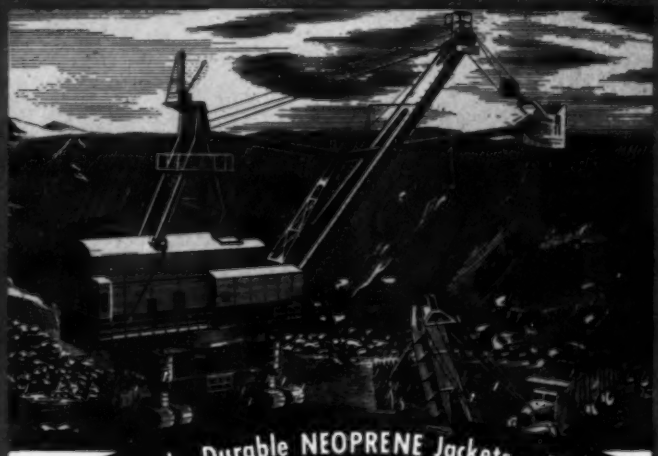
The concluding session of the meeting, presided over by H. O. Tompkins, managing director, Fuel Merchants Association of New Jersey, was featured by an address on modern coal-yard design by W. B. Neill, president, William Neill Constructors, Inc., and a discussion of retail merchandising by A. H. Bearse, Barrows Coal Co. A. C. Callen, head, Department of Mining Engineering, Lehigh University, summarized the conference.

NATIONAL ELECTRIC

TYPE SH-D

Indestructo

PORTABLE POWER CABLES



Have Tough, Durable NEOPRENE Jackets—They have the Abrasion Resistance strip-mining operations need

You can't expect operators of draglines and power shovels to "baby" trailing power cables. Taking all the care possible, it's still a tough job for *any* cable. That's why we build lots of *abuse resistance* into NE *Indestructo* cables.

The abuse that trailing cables must take soon reveals their built-in stamina and quality. You'll find that *Indestructo* means *—greater safety . . . longer life . . . fewer replacements.*

Let us send you our new Mining Machine Cable Catalog. Also see NE *Indestructo* listings in "Mining Catalogs."

NE *Indestructo* Type SH-D. Recommended above all other types for maximum safety and where potentials are over 2,000 volts. Each insulated conductor has individual tinned copper shielding braid. Grounding conductors are laid in the valleys for compact cabling. A reinforcing braid, vulcanized between the inner and outer Neoprene jackets, imparts a "tire-like" quality to the sheath, and increases the ultimate tensile strength.

The tough, durable Neoprene sheath, vulcanized in a continuous lead mold, insures a dense, smooth, long-wearing jacket which resists flames and abrasion, cutting, chipping—protects the cable against oils, grease, heat and acidulous waters.

Pennsylvania Flame Act 206: Where required, "P-106" embossed on jacket is approval number.

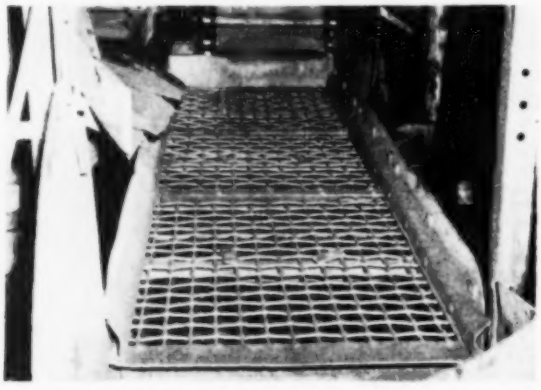
National Electric
PRODUCTS CORPORATION

1371 CHAMBER OF COMMERCE BLDG., PITTSBURGH 19, PA.

Performance Proven

SECO VIBRATING SCREENS

For clean, properly-sized coal



This Seco double-deck screen has been giving trouble-free service in the tipple of Abbie E. Landsberry & Son, near Woodland, Pennsylvania, for over eight years. Mr. Landsberry states, "We have had various types of coal screens, but never have had a screen that gave us the service, without trouble, that our Seco has given us."

"I've seen them all -- Seco's the best for accurate sizing and smooth operation." John B. Gordon, Gordon Coal Company, East Bernstadt, Kentucky. This single-deck Seco vibrating screen takes about 95 tons per hour. Large lumps that have to be scalped off do not cause any undue stress or strain because a Seco screen is built to take it. The feed end cannot bog down because of the Equalizer Assemble which rigidly connects the live screen body to the base frame."

Let Seco screening experts help you improve coal screening results. Write Dept. CA-6 for Coal Bulletin 11.

SECO VIBRATING SCREENS

SCREEN EQUIPMENT CO., INC.

BUFFALO 21, NEW YORK

In Canada, United Steel Corp. Ltd., Toronto, Ont.

Bureau Dedicates Coal to Oil Demonstration Plants

More than 20,000 persons, including 500 representatives of big oil companies, government officials and armed forces personnel, attended the dedication of two synthetic liquid fuel demonstration plants at Louisiana, Mo., May 8. When in full operation the plants, besides making 80 to 400 bbl per day of oil and gasoline from coal, will provide operating data and experience to guide private industry in the building of commercial-scale plants to make liquid and gaseous fuels from coal. In fact, that was the theme of an address by Secretary of the Interior Krug at the ceremonies. Secretary Krug virtually told private industry to take over from here, warning that commercial development of the infant industry is needed to guard the nation against emergencies threatening its existence.

Dr. L. L. Hirst, chief, Coal-to-Oil Demonstration Branch, unveiled a plaque commemorating the dedication and Dr. James Boyd, director, Bureau of Mines, introduced the speakers. Special guests were hauled from St. Louis to Louisiana in a train powered by diesel fuel made from coal and were driven about the government reservation in automobiles operating on gasoline made from coal.

States Weigh New Laws On Deep and Strip Coal

Gov. James H. Duff, of Pennsylvania, recently has signed into law new legislation banning local taxes on coal and other natural resources. The law becomes effective for municipalities and school districts at the start of their next fiscal year. It revises the controversial 1947 law, which permitted cities, towns, boroughs, first-class townships and school districts to tax anything not already taxed by the state. Since 1947, local government units had imposed 181 such taxes on coal. Revision of the tax law by the legislature and Gov. Duff came after a drawn-out controversy in the state capital, in the course of which the lawmakers killed proposals to increase from $200 to $500 per acre the bond required of strippers, require safety chambers in all mines and levy a 2c-per-ton tax on coal to prevent mine cave-ins and isolate mine fires.

Earlier, on Apr. 29, the Pennsylvania legislature sent to Gov. Duff bills giving municipalities authority to buy up underground coal pillars to protect the surface from cave-ins; upping strippers' bonds from $200 to $300; permitting anthracite strippers to use in the following year the unencumbered portion of the $25-per-acre bond posted in the previous year; eliminating the safety regulation calling for a footman and a headman at the top and bottom of slopes and shafts if the hoisting engi-

"Eucs" CUT COSTS for MORGAN MINES, INC.

Shown is a 20-ton Bottom-Dump Euclid Coal Hauler . . . 150 h.p. Diesel engine . . . tires 12.00 x 24 front, 21.00 x 24 drive and trailer wheels . . . top loaded speed 32.6 m.p.h.

Starting with only four "Eucs", Morgan Mines, Inc., now owns and operates 17 Euclid Bottom-Dump Coal Haulers of 20 ton capacity at open pit mines in southern Illinois and western Pennsylvania.

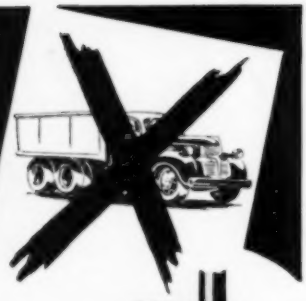
"We use 'Eucs' because they haul more coal from pit to tipple faster and at lowest cost per ton", says Mr. Harrison Eiteljorg, president of the company. "Our experience with Euclids has been so satisfactory that they are now standard hauling equipment at three of our operations and will be used at our new mine at Herrin, Illinois".

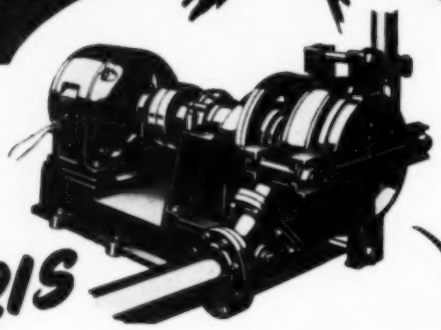
This comment is typical of many received from open pit operators who select Euclids for their off-the-road jobs. Economical performance under a wide range of operating conditions makes Euclids your best bet for low hauling costs.

THE EUCLID, ROAD MACHINERY CO., Cleveland 17, Ohio

EUCLIDS *Move the Earth*

EASIER
DISPOSAL of silt, coal refuse!





MORRIS TYPE R SLURRY PUMP

Saves you the high cost of trucking refuse away!

In coal washeries and processing plants, Morris Pumps have been saving coal operators thousands of dollars in waste disposal operations. They eliminate expensive truck maintenance . . . trucking labor . . . and in many cases, they eliminate the building of roads for trucks to travel.

Morris pumping installation is simple in design . . . low in cost

Morris furnishes pumps of various types depending upon the operating conditions . . . type of refuse to be handled . . . static discharge head . . . length of pipe line through which refuse is discharged.

Morris also recommends the size of piping best suited for the job. Pipe laying expense can be kept at a minimum by using light weight abrasion resisting pipe, easily and quickly coupled . . . easily moved . . . suitable for uneven terrain.

REDUCE YOUR OPERATING COSTS—NOW!

Morris Pumps are ideally suited to the removal of fine silt and other types of refuse. They're easy to install . . . easy to maintain . . . easy to dismantle.

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gineer has a clear view of the mantrip; appropriating $15,000 to Penn State College for a study of burning gob piles; requiring coal companies to make monthly reports of production and man-hours to state mine inspectors; and providing for the posting of state mining laws in booklet form at all mines. Meanwhile, the Pennsylvania Supreme Court reversed the decision of the Court of Quarters Session of Clearfield County and held the 5c-a-ton tax levied by the school district of Lawrence Township to be null and void.

Elsewhere, in Illinois, a bill was introduced that would require operators to post bond assuring that entrances to abandoned mines would be sealed. In Ohio, the legislature passed and sent to Gov. F. J. Lausche a bill making sweeping revisions of the state's mine-safety laws. The new bill would enlarge the authority of the state mining department, require the chief of the department to act on recommendations of deputy inspectors, speed the analysis of samples of mine dust and air, reclassify gassy and non-gassy mines, require that dust be controlled at its source, tighten up ventilation requirements, compel operators to report all fires to the chief of the state mining department and require that abandoned vertical shafts be filled or sealed with reinforced concrete. Observers reported the bill was sure to gain Gov. Lausche's approval.

In Kentucky, a subcommittee of the state Legislative Research Committee, investigating damage to lands by strip operators, reported Apr. 29 that few operators in western Kentucky were making efforts to replace topsoil and that much land had been depleted into barren wastes. Observers predicted that the legislature might attempt to force strippers to pile up topsoil, level off mined lands and replace the topsoil before abandoning their pits.

•

10 Miners End Sit-Down And 6,000 Resume Work

Ten miners who had stayed underground for three days to protest alleged pay docking emerged April 22 from the No. 6 colliery, Lehigh Navigation Coal Co., thus ending a sympathy demonstration that had idled nearly 6,000 miners in the Panther Valley area. The stoppage was said to have interrupted conciliation proceedings to settle the dispute.

The stoppage was the third sit-down in a long-standing dispute over the pay due miners who leave the pit before the work day ends. The union-operator contract provides for early quitting if work conditions are "bad."

The reason for the end of the latest sit-down was reported to be a promise by John L. Lewis to take up the dispute with top company officials. While the 10 miners stayed underground, air supply was maintained in the mine and food sent down from the surface.

How does your weight of MINE TELEPHONE CABLE compare with this?...

Take a minute to interpret the benefits you can gain from a drastic weight reduction in your mine telephone cable. How much you can save by changing to Ankoseal Telephone Cable is shown in the following comparative table:

Comparison of 26 pair—No. 22			
	Ankoseal (armored type)	Paper-Lead	Rubber plus Neoprene
Weight per 1,000 ft.	355 pounds	708 pounds	442 pounds
Weight saving with Ansonia Ankoseal		353 lbs. or 49.9%	87 lbs. or 19.7%

You will note that the comparison above is based on *armored* Ankoseal Cable. If you use unarmored mine telephone cable, the weight reduction is even greater. ANSONIA can furnish either type according to your requirements.

Besides this impressive weight-saving, Ankoseal is ideal for mine service in all other respects. It provides high resistance to moisture, oil, mine water acids and all other natural enemies of ordinary cable jacketing.

We'll gladly estimate the benefits of Ankoseal Mine Telephone Cable in your particular case, if you write us about your needs.

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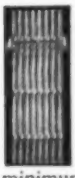
This cross section drawing shows how wedge-shaped members of Cambri-Wedge Wire Screens reduce clogging. Any dirt particles small enough to fit through the top opening between adjacent wires fall freely through the entire screen. Special Riffle Surface wire gives minimum moisture content in dewatered slurry — more complete dewatering.



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All-Ohio Safety Congress Elects New Officers

NEWLY ELECTED OFFICERS for the Mining Section of the 20th Annual All-Ohio Safety Congress to be held in Columbus in April, 1950, are: vice chairman, C. T. Cole (left), safety director, Midvale mine, Columbia Coal Division, Pittsburgh Plate Glass Co.; chairman, Clyde L. French, personnel manager, Goodyear mine, Wheeling Township Coal Mining Co.; secretary, R. C. Owens, secretary-treasurer, District 6, UMWA; and retiring chairman, J. S. Matthews, safety director, Willow Grove mine, Hanna Coal Co.

Mining Maintenance Group Seeks New Branches

The Mining Electro-Mechanical Maintenance Association, which formally organized its first local branch in the lower Allegheny River area in September, 1948, and has since chartered other branches in western Pennsylvania, now is inviting inquiries about the organization of additional local branches in Pennsylvania and elsewhere.

Purposes of the ME-MMA are: (1) to promote safety and efficient operation of mining machinery and equipment, (2) to provide a forum for exchange of experience and information on mining maintenance problems, (3) to increase the knowledge of members about the application, installation, selection, care and operation of machines and equipment and (4) to cooperate with members and the mining industry in the development, application, installation and maintenance of machines and equipment.

The new association got its first start through the interest of men associated with the U. S. Bureau of Mines, the Pennsylvania Department of Mines and the Mineral Industries Extension Service of Pennsylvania State College. A central advisory council has been set up to help organize new branches wherever they are desired. Branches are self-governing groups, holding their own monthly meetings. Dues are assessed locally and members of the central advisory board are elected by local branches.

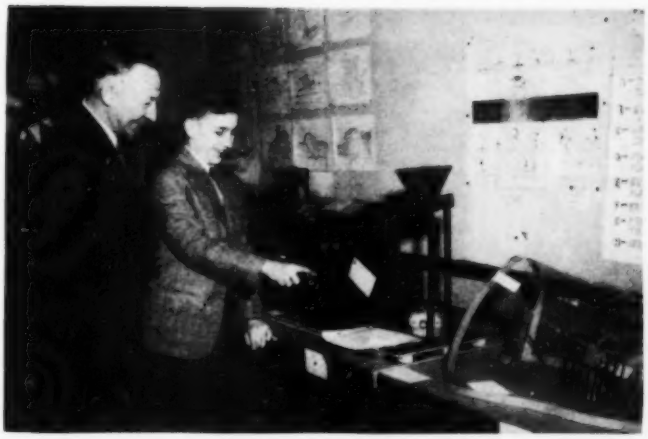
Four classes of membership have been set up, as follows: (1) members, who participate in or direct the operation and maintenance of equipment; (2) honorary members, chosen for outstanding service in connection with the association; (3) associate members, who are not employed in actual mining, such as equipment representatives and state and federal mining officials, and (4) patron members, who are business firms interested in the association's work.

Inquiries about organizing new groups may be addressed to Donald J. Baker, ME-MMA, 1001 Empire Building, Pittsburgh 22, Pa.

•

Mine Inspectors Set for Meeting in Pittsburgh

The Mine Inspectors' Institute of America will hold its 39th annual convention in Pittsburgh, Pa., June 13-15, at the William Penn Hotel. Addresses scheduled for the meeting will deal with safety factors of the continuous mining machine, control of mine fires and mine dust, suspension-bolt roof support, mantrip safety, first-aid training, rock-dusting and the status of state mine inspectors. Other features of the program will include a buffet supper on Sunday preceding the opening of the convention, a visit on Tuesday to the plant of Mine Safety Appliances Co., a tour of Pittsburgh Wednesday afternoon and the annual banquet and dance Wednesday evening.



Model Coal Shaker Wins Science Prize for School Student

ARTHUR LIVINGSTON, 13, eighth-grader from the Hays, Pa., elementary school, shows R. D. Spellman, chief engineer, The Rust Engineering Co., features of his prize-winning operating model mine shaker at the Buhl Planetarium during the 10th Annual School Science Fair. Arthur had just received one of the Rust special $25 "Excellence in Engineering" prizes from Mr. Spellman. Over 500 students from Western Pennsylvania elementary and high schools had 373 exhibits at the Fair, sponsored by the planetarium and The Pittsburgh Press.

C. W. & F. Official Made Illinois Mines Director

Walter Eadie, mine manager, New Orient mine, Chicago, Wilmington & Franklin Coal Co., West Frankfort, Ill., was appointed director of the Illinois Department of Mines and Minerals in mid-April by Gov. Adlai Stevenson, succeeding Prof. Harold Walker, head of the Department of Mining Engineering, University of Illinois, who took over temporarily following the death of James W. Starks.

Mr. Eadie, a veteran of 40 years in coal mining, has been associated with C. W. & F. for 24 years. He started in the industry as a miner and in 1922 became a supervisor.

•

Union Sued for Damages In Virginia Dispute

Damage suits totaling $300,000 against the UMWA have been filed in Abingdon, Va., as an outgrowth of alleged injuries inflicted during violence at the Gilliam & Hodges strip mine in Buchanan County, Va., April 21, 1948. The plaintiffs, Paul B. Melvin, Fayetteville, N. C., and William P. Herron, Buffalo, S. C., have named 100 individuals, UMWA District 28 and Local No. 7488 as defendants. Mr. Herron is asking $100,000 actual and $100,000 punitive damages, Mr. Melvin, $50,000 actual and $50,000 punitive damages. The plaintiffs contend that they were beaten with sticks, slate and other weapons and were permanently injured and disfigured when union members attacked workers at the Gilliam & Hodges operation.

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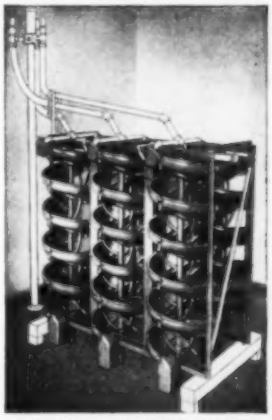

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Unique wedge-shaped members promote maximum drainage in washing, reduce clogging and give perfect rigidity to the screens. In service here and abroad, Cambri-Wedge has proved to give up to 4 times longer life than other type screens.

Cambri-Wedge Screens are available in a wide range of metals, including stainless steel—with Flat or the super-efficient Riffled Surface—and with mesh openings from .005" up.

Also available, Cambri-Wedge Wire Conveyor Belts.

FREE FOLDER! See how Cambri-Wedge Screens can save you money—speed washing or classifying—write today. Also ask about regular woven stainless screens in square or oblong mesh or weave.

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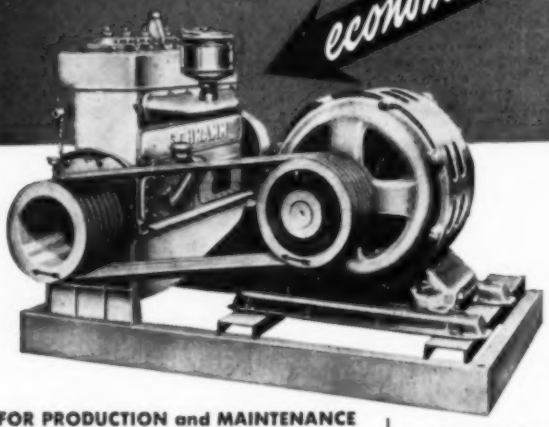

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- More Bearing Surface

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THE COMPRESSOR PEOPLE

•

WEST CHESTER PENNSYLVANIA

New Developments

● The new contour stripping of The Lorado Coal Mining Co., being carried on above its No. 2 mine, Lorado, W. Va., by the Bailey Construction Co., is now in full production, with an output of 2,000 tons daily. The Stockton seam being mined has about 12 ft of recoverable coal and lies 800 ft. above the underground workings of No. 2. Five shovels are employed and the coal is loaded in five 25-ton trucks for transport to a 1,760-ft-long rope-and-button conveyor that lowers it to the No. 2 plant for cleaning. Some 543 acres of coal is available for development.

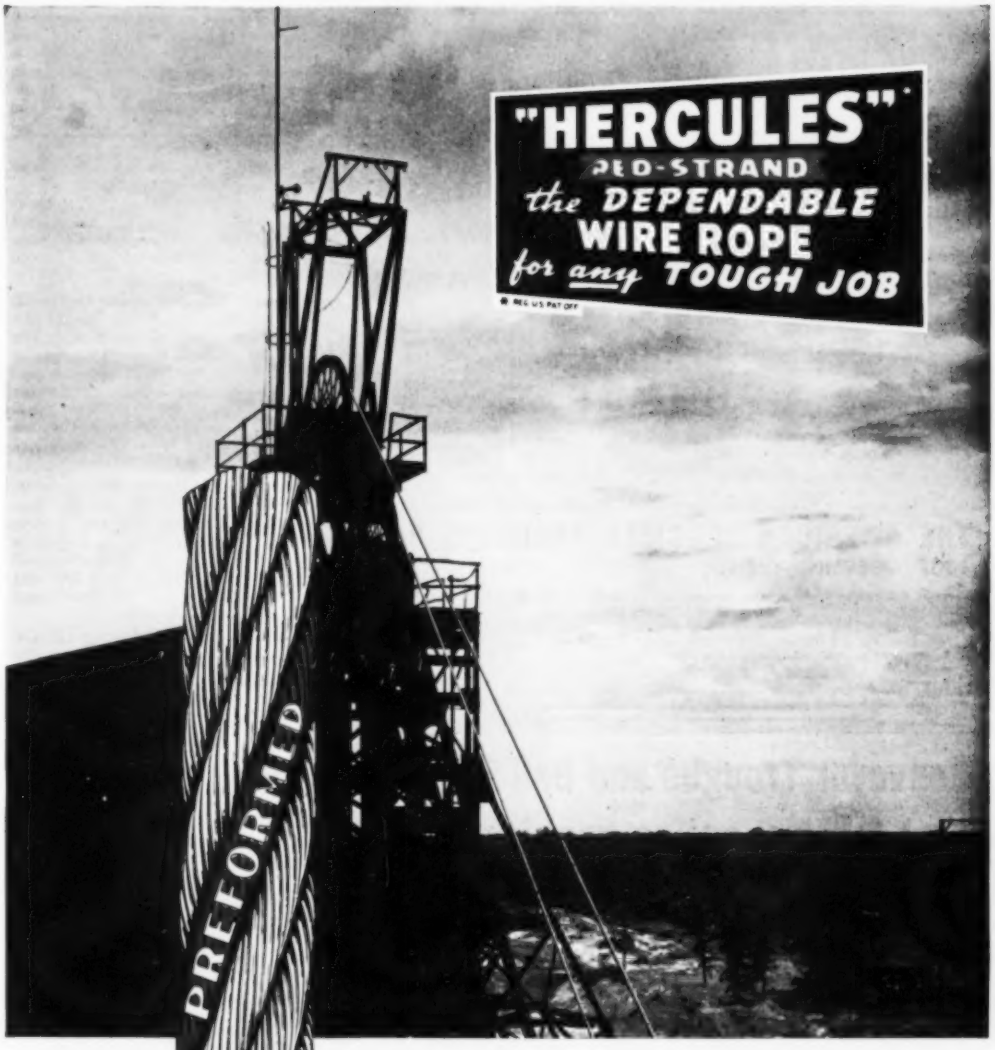
● Fleming & Jobb Co., Pomeroy, Ohio, has leased 772 acres of coal land in Gallia County, Ohio, for stripping operations. The company is under contract to supply 20,000 tons of coal a month to the new Philip Sporn power plant near Graham Station, W. Va.

● Some 54 tracts of coal land reportedly have been leased by the Saginaw Dock & Terminal Co., Cleveland, for development by a new mine to be opened by the David Z. Norton Co. southwest of St. Clairsville, Ohio. Construction of a tipple is expected to be begun this summer and the operation will load on the Wheeling & Lake Erie R.R., at point near the Willow Grove portal of the Hanna Coal Co.

● Negotiations reportedly are under way by the Union Carbide & Chemical Co. for the purchase of the coal rights in about 7,000 acres of land in Meigs County, Ohio. The coal, lying 100 ft or more under the surface, is expected to be developed by underground methods and the coal produced reportedly will be transported via the Ohio River to the new $50,000,000 plant being built by the company near Marietta, Ohio. If arrangements are completed, the property will be the second large acquisition of coal by Union Carbide since plans for the new plant were announced.

● Mine No. 151, Consolidation Coal Co. (Ky.), Van Lear, Ky., closed for a number of years has been leased and is being reopened by J. O. Watson III and G. W. Merritt, partners in the Farwest Coal Co. The operation will produce about 400 tpd and the output will be trucked to Consol's cleaning plant at Mine No. 155, where a 500-ton bin has been built by Consol to receive coal from the Farwest mine and three or four additional small mines to be opened on Millers Creek in the future. Mr. Watson formerly was superintendent of Consol's Mine No. 214 at McRoberts and for the past three years he and Mr. Merritt have been operating a mine near Wayland, Ky. Superintendent of the operation, George Noe, also a former Consol employee, previously was a superintendent for the Central Elkhorn Coal Co.

● A number of coal-loading ramps in Letcher County, Kentucky, reportedly have resumed operation, after being idle since last fall. According to re-



Our Engineering Department will gladly help you select the right construction of Preformed "HERCULES" (Red-Strand) Wire Rope for your particular equipment.

. . . As a measure of value, nothing can take the place of PERFORMANCE . . . By the use of this accurate yardstick — year after year and under extremely severe working conditions of all kinds — Preformed "HERCULES" (Red Strand) has become recognized as "the Dependable Wire Rope for Any Tough Job". For over 60 years the "Red-Strand" has been a reliable guide to safe and economical wire rope service.

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Hendrick Shaker Conveyor Troughs are made of a special high carbon steel that offers great resistance to abrasion, and to bending or breaking stresses under weight of the coal. The sides of the troughs are shaped to give maximum resistance to buckling.

Troughs are made in standard lengths of 10 feet, and 10 feet, 2 inches, but can be made up to 13 feet, 2 inches, in any desired size. Accuracy and uniformity in their construction are outstanding features. Hendrick Ball Frames give the troughs substantial support whatever the floor conditions. Write for full information.

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ports, a large part of the 700 to 800 truck mines in the area have resumed production and the development of a number of new truck operations is expected. Strengthening of coal demand, with the opening of the Lake trade, is understood to be a major factor in the renewed activity.

● The Pittsburg & Midway Coal Mining Co. reportedly has leased for six months some 600 acres of coal lands near Clarksville, Ark., and has started drilling in the area to determine whether large-scale stripping would be economically feasible.

● Purchase of land owned by the Eli K. Price estate by the Kehoe organization was reported last month. The property consists of surface areas in the Junction section of Pittston and Duryea and coal underlying Pittston City, Duryea, Exeter and West Pittston, Pa. Coal produced from the area will be prepared at the breaker of the Kehoe-Berge Coal Co., Pittston.

● Landrey Mining Co., Winslow, Ind., reportedly was planning to open this month its new Landrey No. 3 strip mine at Boonville. The No. 5 seam is to be mined and the operation will have a daily capacity of 1,000 tons and a life of 2 years. Shipments will be made via the Southern R.R.

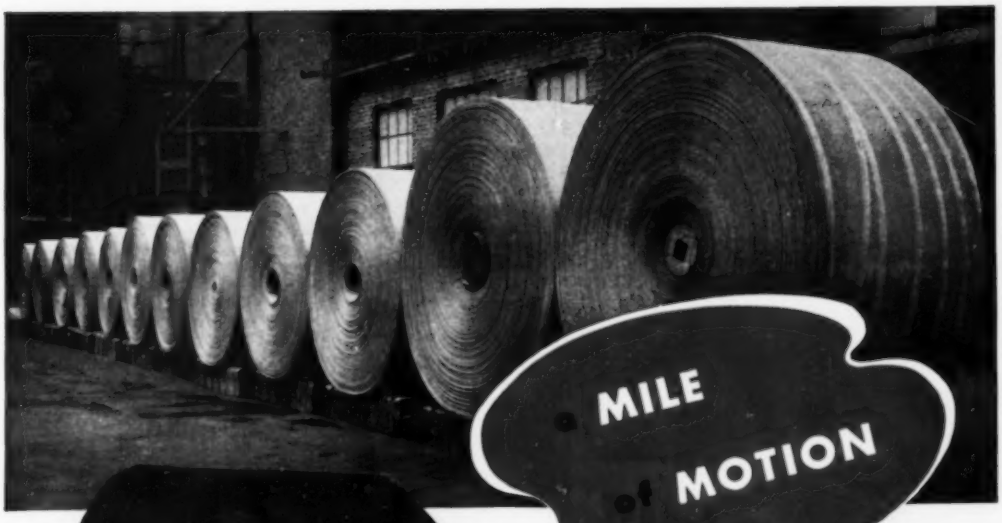
● Alogoma Block Coal Co., Lothair, Ky., expects to open in August a new drift mine at Lothair, planned for a daily capacity of 500 tons and a life expectancy of 30 years. The No. 5A seam is to be mined and coal will be shipped via the L. & N.

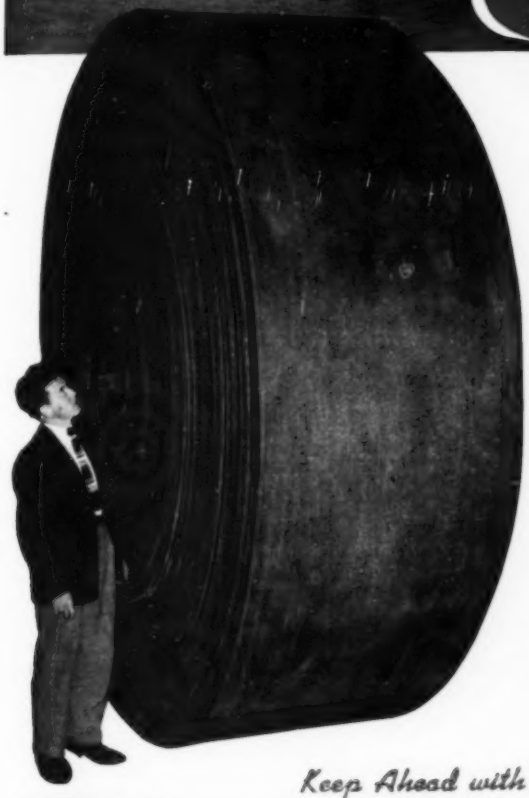
● Opening of its new 1,000-tpd Blue Ridge deep mine by the Blue Ridge Coal Co., Ary, Ky., is scheduled for next September. Located in Perry County, the new operation will mine the No. 5A seam and is planned for a life expectancy of 50 years. Coal will be loaded on the L. & N.

● The A. A. Coal Mining Co., Inc., Marlin, Pa., opened in April its new Marlin Breaker drift mine, with a capacity of 800 tpd from the Mammoth and Skidmore seams. Life expectancy of the operation is 25 years and shipments will be made via the Reading R.R. Earlier this year, the company also opened its new Goodsprings strip mine, planned for a daily capacity of 400 tons and a life expectancy of 25 years.

● The West Freedom Mining Co., Carnegie, Pa., was scheduled to open in May its new No. 4 stripping at Blacksburg, mining the Lower Kittanning and Lower Freeport seams. Production is planned at 1,200 tons daily, with a life expectancy of five years, and shipments via the West Allegheny R.R.

● Truax-Traer Coal Co., has purchased the Miracle mine of the Morgan Creek Coal Co., Racine, Boone County, W. Va. Daily capacity is planned at 1,200 tons or more and coal will be cleaned at Truax-Traer's new preparation plant.





ON MANHATTAN CONVEYOR BELTS

Pictured here are conveyor belt shipping scenes that are typical of the month-in, month-out deliveries that leave the Manhattan plant for all parts of the world. The twelve rolls above represent a mile of motion for the handling and preparation of iron ore in a prominent steel mill. Some of these Manhattan conveyor belts are 60" wide. At left, is a towering roll of 1360' of 6-ply, 42" wide Manhattan Conveyor Belt ready for shipment to an Arkansas clay pit, where it will carry abrasive baroid clay in lump form.

There is tremendous demand for Manhattan Conveyor Belts for underground and strip mining and preparation plants; for quarries and sand and gravel plants; for construction; and for chemical and other industries.

Manhattan maintains leadership with developments like HOMOCORD, the "Rippling Muscles" construction that troughs easily and cushions heavy load impacts . . . and RAY-MAN, the first "Tension-Master" construction using rayon cord strength members designed for heavy-duty, long life operations. Whatever your conveying problems may be, get advice from your Manhattan Engineer.

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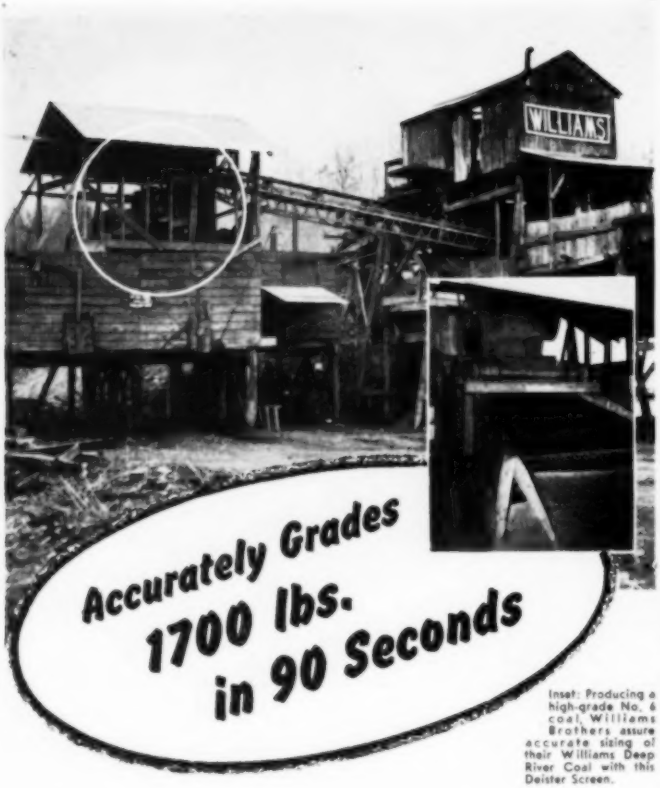

Inset: Producing a high-grade No. 6 coal, Williams Brothers assure accurate sizing of their Williams Deep River Coal with this Deister Screen.

The 4' x 6' double-deck Deister Vibrating Screen owned by the Williams Brothers Mining Company, Morgantown, Kentucky, frequently handles a peak load of 1700 lbs. of coal in 90 seconds.

B. K. Williams says: "At times this Deister Screen has to handle a lot of coal in a hurry. It has handled 112 tons in seven hours. It does a very accurate job of sizing and when we buy another screen it will be a Deister."

Coal is dumped from the 1700 lb. cars onto a grizzly and passed to a Deister Screen that handles everything from four inches down. During periods of peak demand, the Deister Screen grades the coal from each of a string of eight cars, dumped at 90 second intervals. And after nine months of steady, trouble-free operation the screen appears in "factory-new" condition . . . even the original cloth shows no sign of wear.

For complete information on how Deister Screens can handle your coal screening problems, write the Deister Machine Company.

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Welfare Fund Reports $106,840,139 Paid Out

The UMWA Welfare & Retirement Fund reported May 14 that $106,840,139 has been paid out in benefits to bituminous miners and their dependents since the first payments were made two years ago. Payments for disability, widows' assistance, pensions, death and medical care have been made to 344,168 beneficiaries, the report said. Fund officials gave out no statement as to the current rate of payments, income or the balance in the treasury. The report stressed that 73% of the disability payments had been spent for the care of a backlog of disability accumulated over many years before the fund began operations.

More than half of the payments, $67,976,452, have gone to disability cases and widows' assistance. Maximum disability benefits are $60 a month for a miner, plus $20 for his wife and $10 for each dependent child. Maximum payment to a widow is $60 a month, plus $10 for each dependent child.

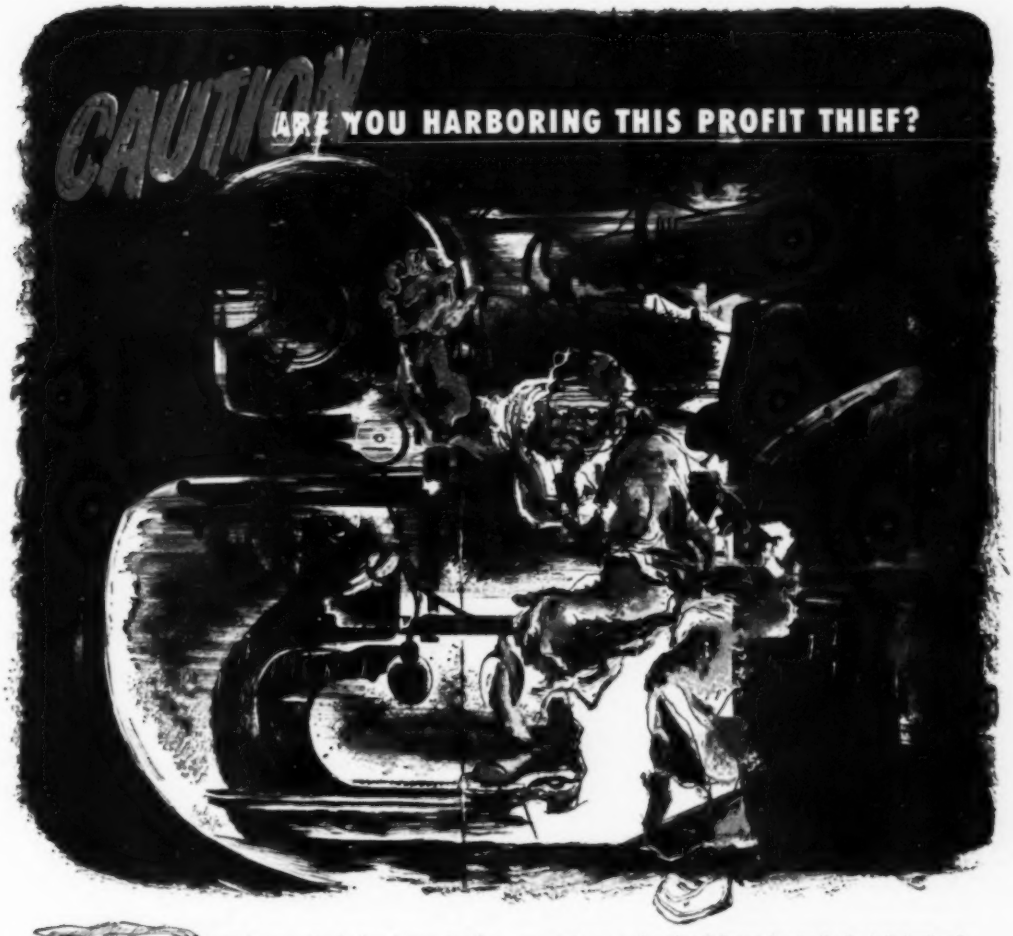
Other expenditures from the fund were reported as follows: death benefits, $12,320,524; pensions, $23,754,637 to 19,188 enrollees; and medical care, $2,788,526. Fund officials pointed out that 98% of the money collected is available to beneficiaries.

Group Honors 63 Mining Men for Safety Records

Sixty-three mine foremen and supervisors of companies affiliated with the Pond Creek-Tug River Mining Institute were cited for their safety records at a fish fry at the Mingo country club, Sprigg, W. Va., Apr. 29. The group was joined by representatives of the Mingo Mining Institute. Present were 250 mine-company officials, supervisors and guests. A special event of the meeting was the presentation of honorary life membership in the Pond Creek-Tug River Institute to 9 past presidents: P. J. Winn, Edward Minns, F. F. Stewart, E. S. Hamilton, Burke Johnson, E. F. Milem, Albert Jones, M. V. Bailey and Matt Kerr. Principal speaker was Earl Maize, safety director, National Coal Association.

Safety lapel buttons were presented as follows:

One-year awards—Dewey Sizemore and Buford May, Fairfax Coal Co.; Julius Lawson, Charlie Reed, Lark Frazier, Homer Thompson, Charlie Browning, Amos Ball, James Reynolds, James McCoy, Murstle Reed and Elka St. Clair, Leckie Collieries Co.; Charley Whitt, Jack Ratcliff and Raymond Boyd, New Alma Coal Co.; Algie Hughes, G. A. Helms, Peyton Lewis, C. Carroll, C. D. Fain, R. L. Stevens, C. Gollimore, W. A. Scott and C. G. Helms, Eastern Coal Corp.; Clyde Dotson, I. A. Willis, Frank Robinett and T. A. Largent, Majestic



He's a particularly vicious thief. He preys on machines in hundreds of mines—slowing production, slashing profits, collecting an enormous toll from the industry.

You think he's not at work in *your* mines? It will pay you to be suspicious enough to find out *for sure*—for his ways are devious.

FOR EXAMPLE . . . HERE ARE SOME PLACES TO LOOK

Are you still scooping grease from drums to guns by the old-fashioned "hand and paddle" method—wasting time, wasting grease, risking costly damage to bearings from coal dust? There's a profit thief at work!

You can save 3¼ man hours for every 100 lbs. of grease simply by modernizing your hand gun loading methods.

Are you lubricating machines by "hand and muscle"—the old, time-wasting, hit-or-miss method? Here's evidence of thievery!

You can save up to 23.9 man hours in applying each 100 lbs. of grease.

Have you ever counted the losses on "downtime"—production interruptions for lubrication of cutters, loaders and cars, or bearing failures due to faulty lubrication? Thievery again!

You can take all the guesswork out of lubrication, make it foolproof, and reduce mining machinery tie-ups simply by mechanizing your lubrication from barrel-to-bearing.

How about it? Is this profit thief loose in *your* mines? His label is "faulty, old-time, costly lubrication methods." Methods that are adding staggering sums to the already high cost of production.

THERE'S ONE PROVEN WAY TO STOP THIS LOSS

An Alemite representative can tell you in 10 minutes how Alemite Methods will simplify and better organize your lubrication procedures. He can show you how mechanized lubrication from barrel-to-bearing will increase your coal tonnage and profits.

Telephone your Alemite Distributor now. Or write to Alemite, 1838 Diversey Parkway, Chicago 14, Illinois.

ALEMITE

MODERN LUBRICATION METHODS THAT CUT PRODUCTION COSTS

STEWART WARNER

If it is, your Hoisting Equipment is at top Safety Efficiency

THE LATCH LOCKS THE LOAD

Make safety certain by specifying Laughlin Safety Hooks when you place your next order for hoisting equipment.

Is Your Present Hoisting Equipment Safe? You can boost its safety factor by replacing ordinary hooks with Laughlin's exclusive Safety Hook . . . there's one for every hoisting or materials-handling job. Available in capacities from ½ ton to 15 tons.

Write for catalog #145. THE THOMAS LAUGHLIN COMPANY, DEPT. 6, PORTLAND 6, MAINE.

LAUGHLIN

THE MOST COMPLETE LINE OF DROP FORGED WIRE ROPE AND CHAIN FITTINGS

Collieries Co.; John Gillman, J. B. White, J. N. Maynard, J. L. Maynard, R. E. Fields, Mickey Larena, G. W. Hall, W. B. Taylor, Arunia Lovell, O. K. Lovell, Paul Mayerchack, Elbert Maynard Jr., Daniel Doka, Walter Maynard, W. L. Curry, Thomas Lowe, J. L. Billings and Chalmer Gibson, Pond Creek Colliery; Steve Balass, Leonard Runyon and Walter Graham, Earlston Coal Co.; John Barbour, Emperor Coal Co.

Two-year awards—William Phillips, John Fish, Julius Kennedy, Oval Mounts and Ramon Patts, Leckie Collieries Co.; Ben May and Jerry May, New Alma Coal Co.; Lee Davis and R. M. Mills, Emperor Coal Co.; Kenner McCoy, Hays Hylton, Sidney Stratton and Burton Jones, Pond Creek Colliery.

Three-year awards—Emery Ball, Leckie Collieries Co.; Joe Moncho, John Zsoldos, George Denton and Andrew Doka, Pond Creek Colliery.

•

L. & N. Ry. Orders 22 Coal-Burning Locomotives

Orders for 22 coal-burning steam locomotives have been placed by the Louisville & Nashville Ry., according to an announcement April 8 by R. C. Parsons, general manager of the railroad, confirmed by J. B. Hill, president.

In commenting, although he predicted a decline of 10 to 15% in car loadings, Mr. Hill added that the general outlook was good and that he had no fears as to the future of coal-burning locomotives.

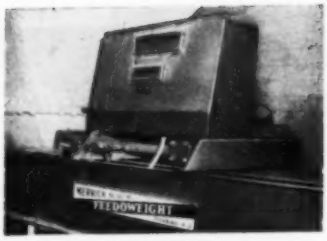
•

Holmes Association Makes Annual Safety Awards

Heroism of five individuals in saving life after accidents and outstanding contributions to safety by a total of 102 individuals, mines and mining organizations in the coal mining industry were recognized by the annual awards of the Joseph A. Holmes Safety Association announced April 26.

In all, the association, which was organized in 1916 to perpetuate the safety work of Dr. Holmes, first director of the Bureau of Mines, awarded 12 Medals of Honor for heroism and 191 Certificates of Honor for outstanding safety records and successful supervisory work in the mineral industries of the United States. Dr. James Boyd, as director of the Bureau of Mines, is president of the Association and its directors include Bureau and industry representatives.

Four of the Medals of Honor and Diplomas among the coal-mining awards were authorized for Aubin Higgins, safety director, William Hill, general mine foreman, and Lonnie McGrew, timberman, East Diamond mine, West Kentucky Coal Co., Madisonville, Ky., and Ed. McGraw, Kentucky state mine inspector, Wheatcroft, Ky., for working together at



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FEEDOWEIGHT

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tells rate per hour —weight per day

A self-contained automatic conveyor scale, combined with automatic gate to give feed rate control. Powered feed regulator operates gate, without restraint on scale beam. Feed rate may be varied. Large feed opening insures even flow. Uniformly feeds bulk material BY WEIGHT; and automatically totalizes weight of materials fed. Durable. Simple to operate. Rugged, heavy duty design. Slow moving parts means long life. Easy to install and maintain.

Manufacturers of
The Merrick WEIGHTOMETER, which weighs any material carried on a belt conveyor without interrupting conveying operation. Complete descriptive matter on request.

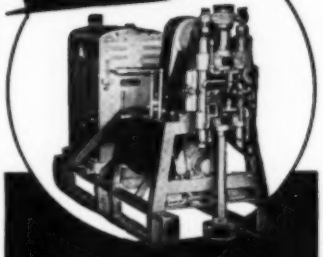
MERRICK SCALE MFG. CO.

Engineers and Mfrs. of Automatic Weighing Equipment

PASSAIC, N. J., U. S. A.

Diamond Core Drilling

CONTRACTORS



Testing mineral properties with our light gasoline drills. SATISFACTORY COAL CORES GUARANTEED. Ground solidification by our pre-pressure grouting method for shafts. Wet mine areas, horizontal holes for drainage. Electric drills for inside mine drilling.

MOTT CORE DRILLING CO.

HUNTINGTON • WEST VIRGINIA

GIVING BELTS THE HOTFOOT

. . . FOR A LONGER LIFE

QUAKER CONVEYOR BELTS PRE-TESTED 18 TIMES TO ASSURE LONG LIFE UNDER MOST SEVERE CONDITIONS

Coal . . . rock . . . slag—all kinds, sizes and shapes and case histories prove Quaker Belts stand up under the most severe usage. They're pre-tested and torture-tested when they are made to withstand every operating condition.

One of the many tests Quaker Conveyor Belts must go through is shown above. A blowtorch, at high heat, held six inches from the surface of the belt for six minutes. Quaker Belts take it and are ready for more. They're tough, rugged and built for longer wear. They're made for the coal industry to assure less maintenance . . . to save loss of labor in repairs . . . to help your mine reduce the "break-even point" in its operations.

Whatever your need for industrial rubber products there's a Quaker Pre-tested Product for the Coal Industry. Power transmission belting for every type of installation . . . rod and sheet packings . . . moulded and braided hose . . . and all kinds of custom-made moulded rubber products. To economize . . . it pays to Quakerize your mine.

HOSE THAT STANDS ABRASION

All types of hose for water, air or steam . . . underground or above ground. Every length of Quaker hose is scientifically pre-tested to withstand proper pressures and extreme wear.

BELTING FOR MAXIMUM HORSEPOWER

Whether it is a heavy duty conveyor hauling coal "out" or a V-belt for fractional horsepower drives in the tipple, Quaker has the belt to fit the need . . . to step up the efficiency.

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PHILADELPHIA 24, PA. • New York 7 • Cleveland 15 • Chicago 16 • Houston 1 • Western Territory

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RUBBER PRODUCTS

FLOOD CITY FUSED LINE SWITCH
ELIMINATES *Costly*
SAFETY SWITCH PROBLEMS

RUBBER SEALED CASE...

The cast iron, RUBBER-SEALED case eliminates the hazards of coal dust and water seepage...yet is readily accessible. Unit is compact, only 12"x7"x4¾". Extra creepage insulation is provided by using ¾" mounting panel and large clearances to ground.

THE FUSES ARE SWITCH BLADES

The fuses are the switch blades and are the only parts that should need replacing. Other features include; Spring brass fuse support that gives a snap-type break when opened.... Copper supports hold blades in perfect alignment...Reinforced clips held permanently in line by grooved supports...Clamp type terminal in the center. One or two fuses may be used, capacities: 70-200 amps.

Also used as protective disconnecting switch for any motor in its range, or for feeder protection at night when trolley line switch is open.

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STOP TIMBER MAINTENANCE

USE COMMERCIAL LINER PLATES IN ENTRIES, SHAFTS, TUNNELS

When easy-to-install COMMERCIAL Liner Plates are used they're in to stay until you want to move them to another entry! There is no maintenance necessary, they're fireproof, they're installed in sections, bolted together with a wrench. They're ideal! Write!

THE *Commercial*
SHEARING & STAMPING CO. YOUNGSTOWN 1 OHIO

great risk to rescue Ilvey Dunning, who was caught under a fall of rock and menaced by additional falls in the East Diamond mine. The four men, who happened to be nearby when Mr. Dunning was pinned down by a rock, removed him to safety about 15 sec before an estimated 10 tons of rock fell on the spot.

Alonzo Payne, machineman at the Earling, W. Va., mine of the West Virginia Coal & Coke Co., also received a Medal of Honor and Diploma. He and his helper were entombed when a mountain bump destroyed a pillar and caused a caving of the roof. Although Mr. Payne's legs were caught under the machine and both were fractured in several places, and in spite of great pain, he used his hands to uncover his helper from the fine coal in which he was buried, thus saving him from suffocation.

Certificates of Honor were awarded to the following individuals and organizations for promoting health and safety and for supervising the work of others.

Edward Abzanka, Russellton (Pa.) mine, Republic Steel Corp., for supervising an underground crew without a lost-time accident from Aug. 1, 1941, to Dec. 31, 1948, a total of 258,030 man-hours.

W. C. Keck, Crescent No. 2 mine, Republic Steel Corp., Charleroi, Pa., for supervising an underground force without a lost-time accident from Aug. 17, 1941, to Dec. 31, 1948, a total of 270,752 man-hours.

George McClafferty, Republic Steel Corp., Indianola, Pa., for supervising a tipple force of 23 employees without a lost-time accident from Sept. 1, 1943, to Dec. 31, 1948, a total of 259,440 man-hours.

Desire Tahon, Republic Steel Corp., Russellton, Pa., for having worked in coal mines for 51 years without a lost-time injury.

Jerry M. Thomas, Republic Steel Corp., Elco, Pa., for nearly 70 years, without a lost-time injury.

W. T. Chaney, Logan County Coal Corp., Lundale, W. Va., for supervis-

MANY COMPANIES DO!

MANY COAL-MINING COMPANIES make it a point to write us of personnel changes on their staff for inclusion in COAL AGE'S "Personal Notes" section, as well as other news of their company, such as new mine developments, safety and production achievements, annual staff functions, etc., accompanied by pictures where suitable and available. They know that friends, business acquaintances and employees all enjoy reading such news in COAL AGE. You, too, are invited to write us whenever the occasion arises—it takes only a minute. Job changes from the individuals concerned also are welcome. Address: News Editor, COAL AGE, 330 West 42nd St., New York 18, N. Y.

TOP CUTTING

Kennametal bits on this Jeffrey 29-C average 1,163 20-foot places before they are replaced.

Summary of Savings with this bit as reported by Romeo Silvester, Mine Supt.

Mine production between Sept. 29, 1947 and Apr. 4, 1949-558,261 tons

Number of bits used—
1000 Kennametal U-7's

Total bit cost—
1000 x $1.15 $1150.00

Bit cost per ton—
$1150.00/558,261 tons—$.0020

Number of places cut before bits are changed—
Conventional, 5
Kennametal, 64

Time saved on bit changing—92%

KENNAMETAL U-7's

Reduce Bit Cost to $.0020

at Norton 2 mine, West Virginia Coal and Coke Corporation

Romeo Silvester, superintendent of the mine, says, "We have used Kennametal U-7 Bits for almost two years. They have saved us money on sharpening, and bit changing. They have made a tremendous reduction in our bit cost per ton." Bit cost at Norton 2, figured over a period of nearly two years, is $.0020 per ton. Many of the Kennametal U-7 Bits figured into this cost are still in service. "When these bits are worn out completely," says Mr. Silvester, "our cost will be even less." Savings in terms of lower bit cost, lower sharpening cost, and less bit changing are typical of how dependable, long-lived Kennametal bits reduce cost, increase profits. You, too, can take advantage of these features.

Why not get in touch with us today? Mining Division, Kennametal Inc., Latrobe, Pa.

- **Longer Bit Life**
- **Less Bit Changing**
- **Lower Bit Cost**
- **Faster Cutting**

Write for this **HELPFUL BOOKLET**

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Shovel Operators Are Talking About . . .

A revolutionary new power shovel clutch that provides smooth, positive action in place of jerky, uncontrolled performance . . . a clutch that seldom requires adjustment . . . a clutch with only one working part, and without a single cam, lever, bolt, piston or valve.

THE OSGOOD AIR-CUSHION CLUTCH

It's a power shovel clutch with direct air power that assures positive control, without any "grabbing" effect . . . a clutch that needs no mechanical attention . . . a clutch whose simple operation automatically compensates for any wear on the clutch linings.

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THE OSGOOD CO. OG THE GENERAL CO.
EXCAVATOR
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DIESEL, GASOLINE OR ELECTRIC POWERED • ¾ TO 2½ CU. YD. • CRAWLERS & MOBILCRANES

Use *FLEXIPIPE* . . . the quality ventilating tubing

FLEXIPIPE

Directs fresh air where you need it

The new improved Flexipipe is efficient, serviceable and economical. It's made in a variety of diameters and lengths and with various accessories to take care of your individual requirements. Write us for complete information and sample.

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FLEXIPIPE: Reg. U. S. Pat. Off.

ing without a fatality an average of 278 employees in the Lundale and Latrobe mines for a total of 2,686,136 man-hours in the production of 1,432,768 tons of coal.

W. B. Hayes, Amherst Coal Co., Accoville, W. Va., for supervising without a fatality the production of 3,392,373 tons of coal with an average of 581 employees working 4,518,027 man-hours in Amherst 1A, 1B, and 1C mines.

John Conlon Sr., Plains, Pa., for having worked in the anthracite mining industry for nearly 79 years without a lost-time injury.

W. J. Evans, now chief coal-mine inspector, State of Washington, Seattle, Wash., for working in coal mines of Wales and the Western United States for 53 years without a lost-time accident.

Henry W. Jack, The Wheeling Township Coal Mining Co., Adena, Ohio, nearly 60 years without a lost-time injury.

Ralph Keck, Weirton Coal Co., Isabella, Pa., for supervising an underground force without a lost-time accident from July 24, 1945, to Feb. 23, 1949, producing 408,735 tons of coal.

S. M. Lemons, Summerlee, W. Va., for having only one minor injury in 61 years.

James McLeary, Bethlehem Collieries Corp., Carolina, W. Va., for supervising an underground force of 963 employees in Mine No. 43 for a total of 1,865,349 man-hours, producing 1,678,930 tons of coal.

Harold I. Steel, Bethlehem Collieries Corp., Barrackville, W. Va., for supervising an underground force of 707 employees in Mine No. 41 without a fatality for 3,437,638 man-hours, in the production of 3,893,145 tons of coal.

John W. Williams, Bethlehem Collieries Corp., Barrackville, W. Va., for supervising an underground crew of 22 employees in Mine No. 41 without a fatality from Feb. 1, 1940, to Feb. 1, 1949, a total of 893,331 man-hours, producing 1,140,704 tons of coal.

Fred J. Ravenscroft, Rivesville, W. Va., 59 years and 7 months without a lost-time accident.

Albert E. Smith, Bethlehem Collieries Corp., Barrackville, W. Va., for supervising an underground crew of 20 employees in Mine No. 41, without a fatality from May 6, 1931, to Feb. 1, 1949, a total of 1,882,857 man-hours, while producing 2,278,639 tons of coal.

William Spence, The Union Pacific Coal Co., Reliance, Wyo., for supervising the production of 394,937 tons of coal with an average of 251 employees working 383,888 man-hours without a lost-time accident during 1948.

James Thorpe, Utah Fuel Co., Castle Gate, Utah, for more than 48 years without an accident, and for being a leader in mine-rescue recovery work and entering mines following disasters.

Everett Edward Long, Smithers,

PROX SCORES AGAIN!

NEWLY DESIGNED... PERFORMANCE Proved

CUTTING CHAIN ...AND BIT...

...TO HELP YOU FIGHT RISING COSTS...

...RIGID... DROP FORGED

...COMPACT... STRAPLESS CHAIN

...QUICK...

...EASY...

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MACHINED INTERLOCKS—HARDENED PINS AND BUSHINGS

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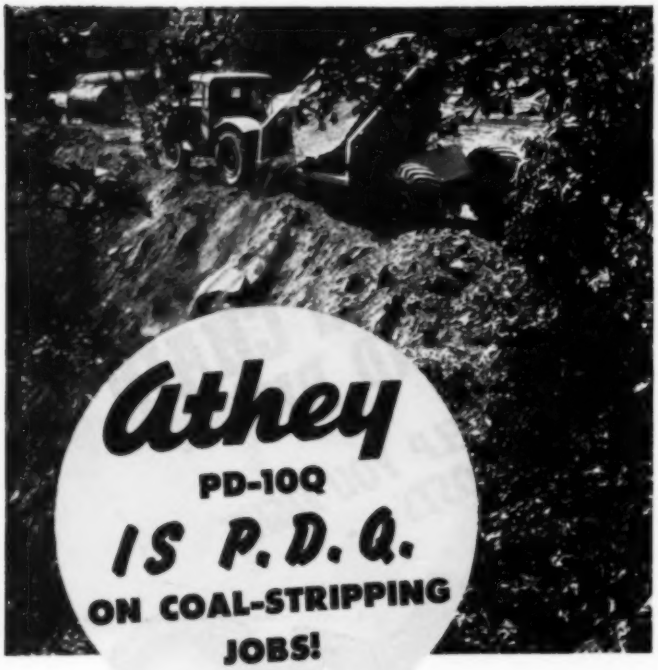

Heap 10 cubic yards of heavy material on the Athey PD-10Q Trailer's high tensile strength body — give your Caterpillar DW10 Tractor the gun. And highball to your destination.

Approach the unloading spot from either direction—the PD-10Q dumps to either side. In no time at all, it's hustling back for another load at the DW10's best speed.

Haul stripped rock, shale or slate in the PD-10Q Trailer. Its body is built to withstand the impact and abrasion of rock loading. Its wide, all-welded frame provides great stability. And heavy, hexagonal cross members absorb dumping stresses. Drawbar is welded to frame for extra strength.

The large 18.00x25 rock-lug, low-pressure tires reduce rolling resistance to give you extra speed with extra pay-pounds. See your Athey-Caterpillar dealer about the Athey PD-10Q for coal-stripping duty!

ATHEY PRODUCTS CORPORATION
CHICAGO 38, ILLINOIS

Athey APCOR Products

Athey products are sold and serviced by the world-wide "Caterpillar" sales organization.

Athey

W. Va., for having worked in coal mines for more than 50 years without a lost-time injury, and for having no fatalities charged to his section or employees working under his supervision while a mine official.

Quay Ray, Sonman, Pa., 62 years without a lost-time injury.

Dotridge Treadway, Naples, W. Va., 51 years without a lost-time injury.

Anthracite Division, Pennsylvania Department of Mines, Harrisburg, Pa., for achieving during 1948 the lowest fatal accident rate per million man-hours worked (0.87) in the history of American coal mining.

The Johnstown *Democrat*, Johnstown, Pa., for outstanding services to the coal industry by devoting considerable space to the promotion of safety and accident-prevention in the Central Pennsylvania coal fields.

Kentucky River Mining Institute, Hazard, Ky., for averaging 1,040,552 tons of coal for each fatality during 1948 for all member companies.

Frank Taddy, Republic, Pa., 45 years without a lost-time injury.

Wesley White, Four States, W. Va., 46 years without a lost-time injury.

L. S. Safriet, Gatliff, Ky., 48 years without an accident.

Certificates of Honor for notable safety achievements also were awarded to the following coal mines and companies:

Amherst 1B and 1C mines, Amherst Coal Co.

Paragon and MacGregor No. 2 mines, Logan County Coal Corp.

Coal Mining Division, Armco Steel Corp., and Stickney mine.

Mines Nos. 41, 43 and 51, Bethlehem Collieries Corp.

Mine No. 25, Consolidation Coal Co. (W. Va.).

Wheelwright mine, Inland Steel Co.

Mines Nos. 1, 7, 15, 20 and 24, Island Creek Coal Co.

Mine No. 1, Pond Creek Pocahontas Co.

Butler, No. 6 and No. 14 collieries, Jermyn-Green Coal Co.

Crichton No. 1 mine, Johnstown Coal & Coke Co.

No. 58 mine, Peabody Coal Co.

Kettle Island mine, Pioneer Coal Co.

No. 5 mine, Pennsylvania Electric Co.

Thacker mine, Pond Creek Colliery.

Pyne mine, Pyne-Taylor Co.

Federal No. 1 and Midvale No. 2 mines, Eastern Gas & Fuel Associates.

Reitz No. 3 Upper, 3B, Nos. 4 and 5 mines, Reitz Coal Co.

Supervising officials, Red Jacket Coal Corp., and Junior and No. 5 mines.

Banning, Crescent No. 2 and Russellton mines, Republic Steel Corp.

Brooklyn mine, Scotia Coal & Coke Co.

Nos. 1, 2, 3 and 4 mines, Superior Coal Co.

Mine No. 14, Teterling Bros., Inc.

Spruce River No. 4 mine, The Spruce River Coal Co.

Reliance No. 7, Reliance No. 11,

8 A.M. EFFICIENCY

maintained **ALL DAY**
with **ORTON**

ONE-MAN

AERO-CRANE

POWERMATIC AIR-CONTROL

No Afternoon Fatigue Let-Down

One Man, with the Powermatic Air-Control Orton Aero-Crane loads and unloads cars, trucks, gets material onto the stockpile and off with *early-morning* efficiency *all day.*

Effortless Orton air-control enables one man with the Aero-Crane to handle 200 to 1000 lb. loads that eat up the time of a yard crew. Aero-Crane pays for itself in saved man hours.

Designed to SPEED Yard Work

Orton one-man Aero-Crane travels rapidly job to job with boom in any position.

Insures SAFE lowering of heavy loads against *compression of the engine.*

Full-view cab. Full circle turntable. Anti-friction bearings. Non-burn Orcoin V-type clutches. SAFETY spring-applied, air-released hoist brakes. Electro-welded construction.

Eight models, 3,500 to 60,000 lbs. capacity. Diesel or gasoline powered.

Send for Catalog 73-B for full details and roster of Orton world-wide users

◄ Long-life Orton Aero-Crane has most rigid car body of any crane built. Goes anywhere a truck will go. Operated, traveled and steered from craneman's seat.

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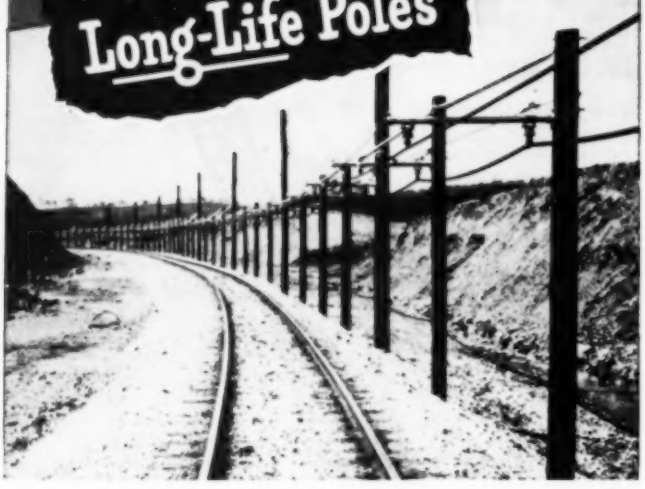
Reduce Costly Replacements and Repairs

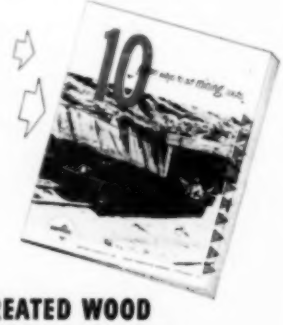
WITH KOPPERS Long-Life Poles



THE trolley pole installation pictured above is a money-saver for mines. These Koppers Poles are made from strong Southern Yellow Pine, and are pressure-treated with creosote. This treatment protects poles against decay . . . greatly reduces the number of costly replacements. Koppers Pressure-Creosoted Poles provide rigid support for trolley and feed lines; also, they *retain* their strength, and therefore minimize repairs.

There are many other places where Koppers Pressure-Treated Wood can save money for mine operators. For example, by using pressure-treated wood, instead of ordinary wood, in ties for main haulageways—in timber sets and props—costs can be cut by as much as 62% and 76%, respectively.

To find out the full story of these substantial savings, send for our free book, "10 Proven Ways to Cut Mining Costs."



KOPPERS PRESSURE-TREATED WOOD

KOPPERS COMPANY, INC., Pittsburgh 19, Pa.

Stansbury 7½ seam, Superior, D. O. Clark and Winton No. 7½ seam mines, The Union Pacific Coal Co.

Nos. 5, 7 and 9 mines, The Carbon Fuel Co.

West Kentucky Coal Co.

Westmoreland Coal Co., and Hutchinson and McCullough mines.

Mulga mine, Woodward Iron Co.

Coal mines, Colorado Fuel & Iron Corp., and Frederick, Kebler, Morley and Pictou mines.

Mary Frances No. 1 mine, Mary Frances Coal Co.

Derby colliery, Roda No. 5 and Stonega mines, Stonega Coke & Coal Co.

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Coal Publications

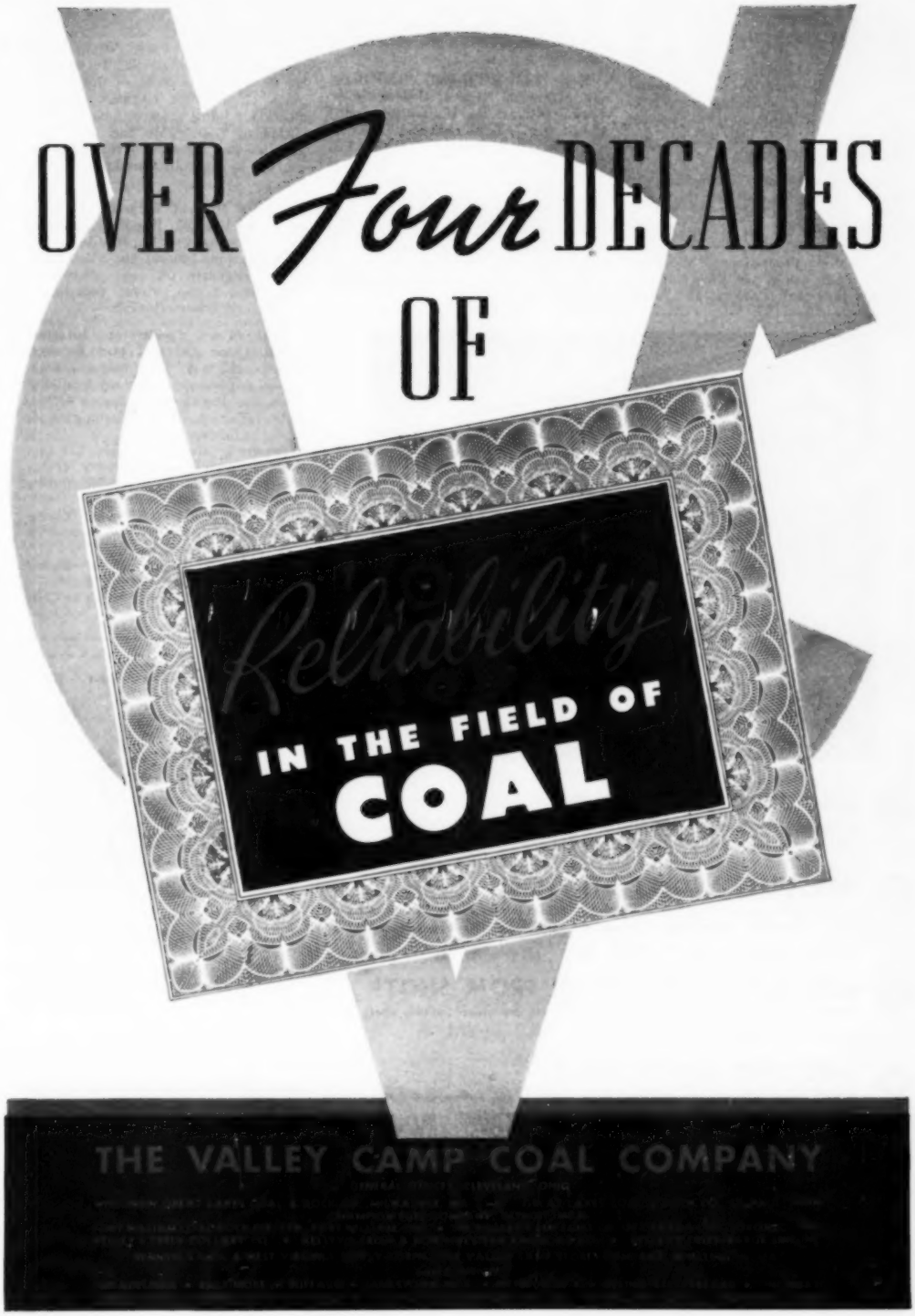
Safety in the Mining Industry, by D. Harrington, J. H. East Jr. and R. G. Warncke. U. S. Bureau of Mines, I. C. 7485. 157 pp. plus charts and maps. 8x10-in; paper; mimeo. Free, Publications Distribution Section, 4800 Forbes St., Pittsburgh, Pa. Broad review of methods used, money spent and results achieved in safety in bituminous, anthracite and metal and nonmetallic mineral mines and in quarrying and petroleum. Fatal accidents have been reduced tremendously in coal, whether rates are based on accidents per million tons mined or on millions of man-hours of exposure.

Supplemental List of Respiratory Protective Devices Approved by the Bureau of Mines, by L. B. Berger. U. S. Bureau of Mines, I.C. 7513. 3 pp. 8x10½-in; paper; mimeo. Free, Publications Distribution Section, 4800 Forbes St., Pittsburgh, Pa. Approvals since March, 1948 (I.C. 7444).

Service Manual for AD-3 and AD-4 Motor Graders. 278 pp. $4, Allis-Chalmers Mfg. Co., Tractor Division Service Dept., Milwaukee 1, Wis. Operation, maintenance and major repair of AD-3 and AD-4 Motor Graders. Sections include, among other topics, descriptions of assemblies and parts, dimensions, fits and tolerances, adjustments and repair instructions.

Formula for Supervision, by H. W. Heinrich. 95 pp. 5½x8¼-in; paper. $1 plus postage, National Foremen's Institute, Inc., Deep River, Conn. The supervisor's problems are broken down into 24 kinds, six kinds in each of four groups. Eight reasons are responsible for problems and there are only four kinds of remedies. A simple, orderly guide for foremen.

114 Checkpoints on How to Prevent Grievances, by Bleick von Bleicken and Carl Heyel. 34 pp. 8½x11-in; paper. $1 plus postage. National Foremen's Institute, Inc., Deep River, Conn. Questions which help a foreman measure his success with his men, in his plant and in his community.


OVER Four DECADES
OF
Reliability
IN THE FIELD OF
COAL
THE VALLEY CAMP COAL COMPANY

Basic Electrical Principles, by Maurice G. Suffern. McGraw-Hill Book Co., 330 W. 42d St., New York 18. 430 pp. 6x8¼-in; cloth. $3.20. Simple presentation of electrical principles on a vocational-education level, requiring no previous knowledge of electricity. Complex formulas are omitted. Questions at each chapter end for review and discussions.

Mathematics for Electricians, by **Martin M. Kuehn** (revised third edition). McGraw-Hill Book Co., 330 W. 42d St., New York 18. 372 pp. 6x8¼-in; cloth. $3.50. Step-by-step progress from simple arithmetic and algebra through use of the slide rule and graphs to vector problems and calculations in alternating current. This new edition adds material on basic arithmetic, logarithms and alternating current.

Slope Sinking Through Water Bearing Strata at Mine 4, Bell & Zoller Coal & Mining Co., Williamson County, Ill., by J. J. Shields and Louis A. Turnbull. U. S. Bureau of Mines, I.C. 7509. 5 pp. plus 5 pp. of illustrations. 8x10½-in; paper; mimeo. Free, Publications Distribution Section, 4800 Forbes St., Pittsburgh, Pa. How two slopes in the Big Muddy River valley were built to pass through water-saturated sandy clay and sand strata extending from the surface to a depth of 70 ft.

German Low-Temperature Coal-Tar Industry, by E. O. Rhodes. U. S. Bureau of Mines, I.C. 7490. 84 pp. 8x10½-in; paper. Free, Publications Section, 4800 Forbes St., Pittsburgh 13, Pa. One of a series of Bureau reports on wartime German developments in mining, preparation and utilization of coal. This one tells how gasoline and oil were extracted from coal tar by distillation and hydrogenation.

Illinois Mineral Industry in 1947, by W. H. Voskuil. Illinois State Geological Survey, Urbana, Ill. Report of Investigations 140. 91 pp. 6¾x10-in.; paper. Reports on coal, petroleum and natural gas, stone, rock, clay metals and other minerals.

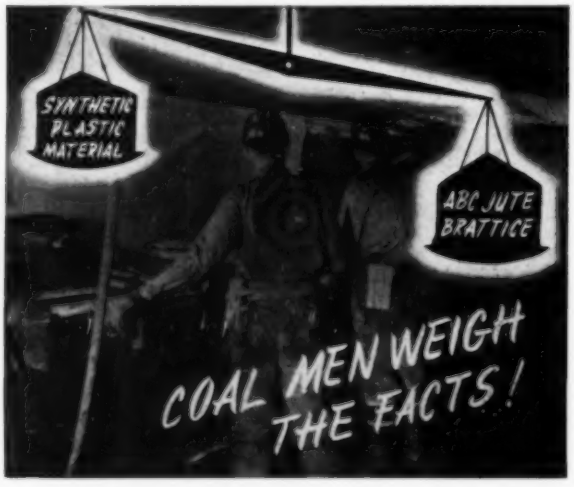
Coal Mines Committee, International Labor Office: Third Session, Pittsburgh, 1949. Four volumes, 6¼x9½-in, paper-bound, now are available from the International Labor Office, 1825 Jefferson Place, Washington 6, D. C., as follows:

Report I: General Report, 211 pp., $1.25. Chapters on manpower, training, housing and pensions for miners around the world.

Report II: Protection of Young Workers Employed Underground in Coal Mines, 40 pp, 25c.

Report III: Vocational Retraining of Disabled Miners, 103 pp, 75c.

Report IV: Hours of Work in Coal Mines, 58 pp, 35c.



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Mr. Okey Howard, Jr., whose picture is shown above, finds that one of the regular McGraw-Hill services is a veritable gold mine of information helpful to him in his job.

Mr. Howard is General Maintenance Foreman for the Hanna Coal Company of St. Clairsville, Ohio. His "gold mine" is an up-to-date source of buying information and complete directory for coal mining machinery, equipment and supplies — McGRAW-HILL'S PRE-FILED MINING CATALOGS.

Mr. Howard says, "*MINING CATALOGS are very useful for reference and location of materials.*"

Other coal men responsible for the buying, specifying or ordering for their mines, who do not have access to this useful service, should write on their company letterhead to McGRAW-HILL CATALOG SERVICE, 330 West 42nd Street, New York 18, New York.

Preparation Facilities

Paul H. Weise, Morris mine, Southview, Pa.—Contract closed with Jeffrey Mfg. Co. for washing equipment; capacity, 75 tph, 4x½-in coal.

Rochester & Pittsburgh Coal Co., Ranglo mine, Twin Rock, Pa.—Contract closed with Jeffrey Mfg. Co. for unit washer; capacity, 75 tph, 6x⅜-in.

Rochester & Pittsburgh Coal Co., O'Donnell mine, Four States, W. Va.—Contract closed with Jeffrey Mfg. Co. for unit washer; capacity, 50 tph, 1¼ x⅝-in coal.

Mid-Continent Coal Co., Green Diamond mine, Marissa, Ill.—Contract closed with Western Machinery Co. for No. 4C WKE (HMS) Mobil-Mill semi-portable heavy-media separation unit with separatory and reclamation circuit equipment, for treating 4-inx10 M coal; capacity, 125 tph.

Princeton Mining Co., Kings Station mine, Princeton, Ind.—Contract closed with Templeton-Matthews Corp. for dump hopper, feeder, vibrating screens, coal and rejects conveyors, 9x17-ft rotary breaker and alterations to present structure, replacing present run-of-mine handling facilities with no increase in plant capacity; r-o-m to be delivered to rotary breaker for reduction to minus-6-in and removal of refuse at feed rate of 500 tph; resultant 6x0 to be delivered to battery of three double-deck vibrating screens for separation into 6x½ going to the present washing plant and ½x0 going to present re-screening plant.

Lumaghi Coal Co., Mines Nos. 1 and 2, Collinsville, Ill.—Contract closed with Templeton-Matthews Corp. for a 200-ton r-o-m hopper, feeder, heavy-duty double-roll crusher, 1,100-ft slope belt conveyor and raw-coal tipple to be constructed at Mine No. 2; screening, crushing and storage to be accomplished in raw-coal tipple, with loading of 6x0 into mine cars for haulage to present preparation plant via a new surface haulage road and with facilities for loading raw screenings and hand-picked lump into trucks; alterations and additions to present preparation plant to include new air-operated jig, crushing and screening facilities for additional stoker coal and added bin capacity for truck loading; facilities designed to handle output from new mine rated at 350 tph.

Montana Coal & Iron Co., Smith mine, Bear Creek coal fields, Montana—Contract closed with Deister Concentrator Co. for three Super-Duty Diagonal-Deck coal-washing tables, two for ¾x0 coal and the other for 1¼x¾ stoker.

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Drop Forged Links

Drop forged for strength, Superior Swivel and Single Link Couplings are built to stand the gaff. No welds to let go with resulting wrecks. Superior Couplings on your mine cars will prevent accidents and reduce haulage costs. Order Superior Couplings for your replacements and specify them on new equipment.

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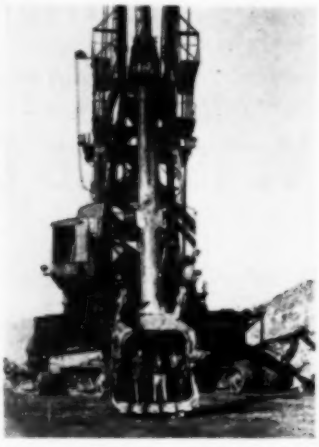
Equipment News

More Detailed Information and Descriptive Literature Normally Are Available on Request Directly to the Manufacturer

VIBRATION ENGINEERING — Organized to help users of explosives, the Vibration Engineering Co., Houston, Tex., marked the opening of its anthracite office at Hazleton, Pa., by a test recording of a blast at the Shen-Penn stripping. The test was witnessed by Shen-Penn officials; Richard Maize, Pennsylvania Secretary for Mines, and representatives of the Vibration Engineering Co., including L. Don Leet, Harvard Seismograph Station, whose work with blasting vibrations laid the foundation for the new concern's operations. Dr. Leet also developed the portable seismograph used in field work.

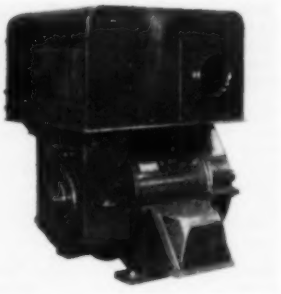
Organized by Dr. Leet, Harold W. White, formerly with the Austin Powder Co., and W. C. Kimball and A. L. Ladner, Apache Exploration Co., specializing in seismographic oil prospecting, a major objective of the firm is development, through vibration studies, of proper blasting methods with short-delay detonators to achieve greater efficiency and insure conformance with state and local blasting regulations. In the illustration above, the portable seismograph is being demonstrated to Richard Maize, Pennsylvania Secretary for Mines, by Mr. Leet (left) and Mr. White (right).

USE OF ELECTRICALLY-HEATED RUBBER of the wire-resistor type now is being extended to industrial applications, according to The B. F. Goodrich Co., Akron, Ohio. Constructed of resistance wires insulated with fabric plies sandwiched between layers of rubber sheeting, with the parallel wires running the length of the rubber, the new-type rubber reportedly can be furnished in any reasonable size, shape or weight and for temperatures up to 300 deg F. The American rubber used is heat-, weather- and oil-resistant and can be applied by adhesion or placed on a metal background for bolting into permanent position.

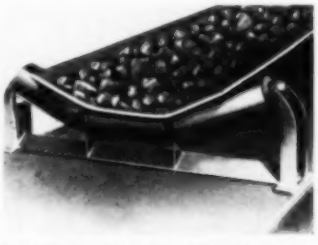


NEW STEEL-FABRICATION METHOD developed by National Annealing Box Co., Washington, Pa., permitted replacing the dipper stick on this Bucyrus-Erie 36-yd stripping shovel with a cylinder fabricated of 1-in steel plate. The new bending method, using a 14-ft pyramid-type Baldwin Southwark plate-bending roll, reportedly is much faster than the conventional method of press bending a few inches at a time and also produces a perfect cone. National Annealing has made sticks of 1-in plate up to 81 ft 6 in long and 33 in in diameter which, although weighing 22 tons, are lighter than a structural member of the same length, as well as considerably stronger.

ELECTRIC MOTORS—Its standard totally-enclosed unit-cooled dc motors in ratings up to 200 hp now are available with a new-type cooling assembly permitting them to operate at slow speeds for long periods of time, according to the General Electric Co., Schenectady 5, N. Y. Driven by a single GE Tri-Clad induction motor, independent of motor speed, one



blower circulates internal air through the motor and unit cooler, while another blows external air through the cooler. Designed for dusty, dirty and oil-laden atmospheres, the motors require no piping, duct-work, air filter or pressurized air supply. Motor air never comes into contact with the contaminated outside air.



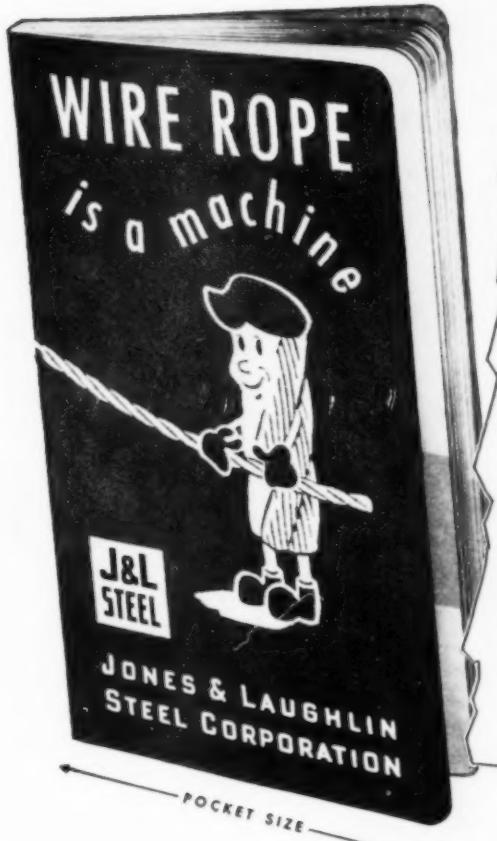
CONVEYOR-BELT IDLERS—SealMaster ball-bearing belt-conveyor carriers announced by Stephens-Adamson Mfg. Co., Aurora, Ill., reportedly feature rigid one-piece welded-steel frames designed to tilt in the direction of belt travel and keep belt centered without guide rollers. Removable rollers and bearing housings are quickly and easily replaced or interchanged without tools. Six permanently sealed self-aligning SealMaster ball-bearing units, independent of their housings, arranged for one-shot, low-pressure lubrication from either side of the carrier, together with hollow live shafts turning with the rollers, reduce friction and power requirements and prolong useful life of carrier, the company reports. Bulletin 1148 is available from Stephens-Adamson.

NEW ALL-PURPOSE HOSE known as "Ortac" is capable of carrying air,

At Last! A WIRE ROPE HANDBOOK FOR THE MAN ON THE JOB!

It's new . . . It's different . . . It's easy to understand

J&L STEEL



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3

This 96-page illustrated book is especially written for the machine operator who handles wire rope constantly on his job. And its handy size—4 3/8" x 7 1/2"—fits into your pocket, ready for instant reference. It's yours for the asking!

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From its own raw materials, J&L manufactures a full line of carbon steel products, as well as certain products in OTISCOLOY *and* JALLOY *(hi-tensile steels).*

PRINCIPAL PRODUCTS: HOT ROLLED AND COLD FINISHED BARS AND SHAPES • STRUCTURAL SHAPES • HOT AND COLD ROLLED STRIP AND SHEETS • TUBULAR, WIRE AND TIN MILL PRODUCTS • "PRECISIONBILT" WIRE ROPE • COAL CHEMICALS

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THE McCARTHY VERTICAL DRILL

For record-breaking performance . . . for ease of operation, you can't top a McCarthy Vertical Drill. Recently, on one difficult job, workers using McCarthy equipment drilled an 8-inch hole 100 feet deep in only 40 minutes! The derrick is raised and lowered by hydraulic power . . . finger tip controlled . . . and a 60 H. P. gasoline motor is part of the standard equipment.

The McCarthy Vertical Drill, manufactured by The Salem Tool Co., is adaptable to high wall and key way drilling and diamond drill boring . . . drills 90% of all limestone and sand rock formations, and readily burrows through shale. Send today for complete information, and for a free copy of The Salem Tool Company booklet.

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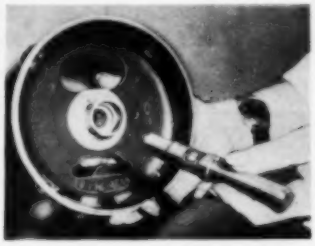
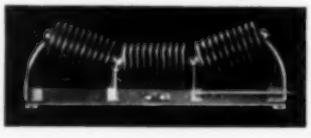
water, oil, gasoline and acids of low concentration and temperature, according to Goodyear Tire & Ruber Co., Akron, Ohio. Made with vertically braided rayon carcass and oil-resisting synthetic tube, fraction and cover, the hose is available in sizes from 3/16 to 1½ in.



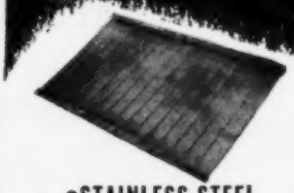
MOTOR MAINTENANCE — Worn sleeve bearings can now be removed from motor endplates and new bearings inserted in one operation with its new bearing tool, according to the Wagner Electric Corp., 6489 Plymouth Ave., St. Louis 14, Mo. The tool consists of a steel rod, accurately finished to accommodate precision-bored bearings on one end and unbored bearings (for undersize shafts) on the other. In operation, the old bearing acts as a pilot, assuring correct alignment of the new bearings, and no reaming is necessary. Four sizes are available, for motors with finished bearing sizes of 0.655, 0.751, 0.812 and 1.062 in.

WIRE-ROPE SLING—A new addition to the line of ACCO Registered Wire-Rope Slings recently announced by the American Chain & Cable Co. Inc., Wilkes-Barre, Pa., is the SW-42 Cable-Laid Grommet with Double ACCO-LOC Splices. Made entirely of preformed improved plow-steel wires, the Cable-Laid Grommet is said by the manufacturer to give flexibility comparable to manila rope and complete freedom from crankiness and can be used in the same types of hitches as manila rope. It is available in diameters from 9/32 to 1½ in., with rated capacities up to 53 tons in basket hitch.



CONVEYOR IDLERS — Industrial Division, Continental Gin Co., Birmingham 2, Ala., has announced a new patented rubber-disk impact idler for troughed, flat and return belts said to be interchangeable with practically all standard idlers. Continental also has announced its new hollow-center rubber-tired impact idlers for heavier installations, as well as special impact idlers to meet spe-

SCREENS FOR EVERY COAL PREPARATION JOB



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•ALL WELDED CONSTRUCTION
•NON-BLINDING

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There is always the possibility of trade names being similar. But, there is only one "WEDGE-WIRE." Designed for faultless performance and engineered to your requirements, WEDGE-WIRE screens are supplied to your requirements in a complete assortment of high grade metals. Send for our free and completely illustrated catalog today!

The cross-section at left shows how KLEENZLOT screens operate on a non-clogging, non-blinding principle.

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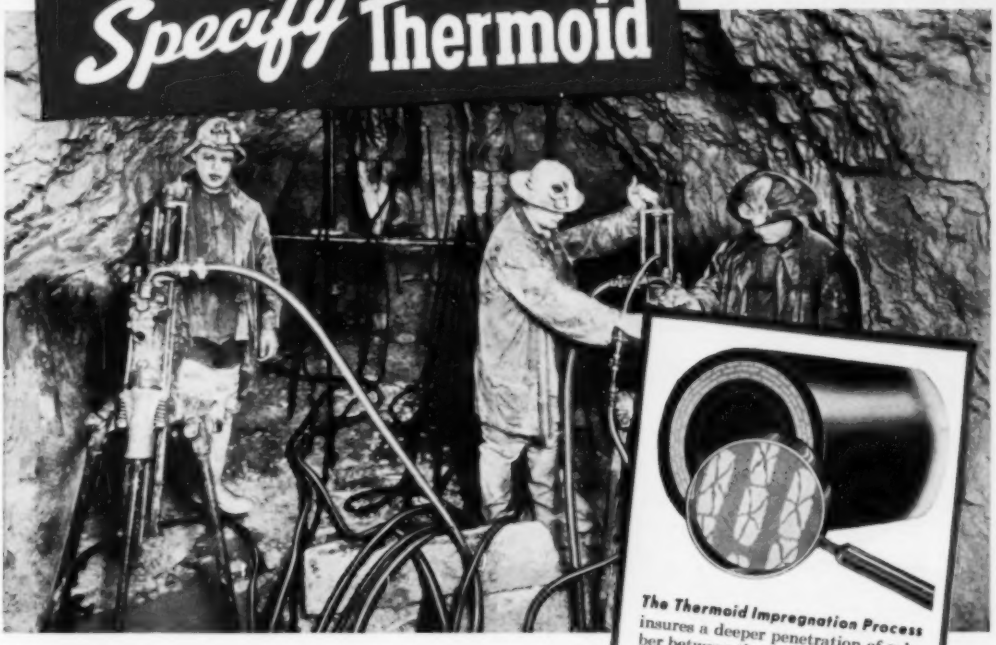
Specify Thermoid



The Thermoid Impregnation Process insures a deeper penetration of rubber between the threads of the yarn, which encases each individual strand with protective rubber. The rubber acts as a sheath between the strands and prevents the destructive abrasive action as the product is flexed in use. To obtain the required rubber penetration, the twist of the yarn must be to exact specifications. With the yarn twisted too tightly, proper penetration of the rubber compound is impossible. This condition produces abrasion, causing premature failure. On the other hand, if the yarn is twisted too loosely, the product lacks tensile strength. Thermoid has discovered the optimum twist of the yarn which assures maximum rubber penetration and greatest strength. The development of Thermoid Impregnation Process is another step forward in Thermoid's planned program of product improvement, assuring maximum service and lower operating costs to industry through the use of Thermoid Industrial Rubber Products.

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From Thermoid's planned program of product development and improvement—a new air hose for mine use. Specifically designed for this exacting requirement—field proven in actual operation—it offers the maximum in trouble-free service. Heavy synthetic rubber oil-proof tube—rayon cord reinforcement for greatest strength and flexibility—smooth extra heavy rubber cover for maximum resistance to abrasion and cutting from sharp rocks.

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cific conditions. All units, regardless of type, are equipped with anti-friction bearings.

MATERIALS HANDLING—New TL-W Tracto-Loader announced by Tractomotive Corp., Deerfield, Ill., is mounted on rubber tires and has a standard ½-yd bucket over the driving wheels and the steering wheels in the rear, a design which, according to the manufacturer, provides exceptionally good traction and easier steering. The TL-W's short over-all length, 12 ft with bucket down, and narrow width, 5 ft 9 in (outside tire measurements), along with the fact that it does not have to ram into material to get a load, facilitates loading in close quarters, it is said.

NEW BUTYL-MOLDED instrument current transformer, Type JKM-3, announced by General Electric Co., Schenectady 5, N. Y., as the first of a new line of butyl-molded instrument transformers, is designed for accurate indoor metering and relay services. Rated 5,000 volts at 25-60 cycles, it is available with single-primary in all preferred ratings, 10 to 800 amp, inclusive. Special coil construction and intimate contact of the butyl with the windings provide increased heat dissipation, thus permitting continuous operation up to 15% of rated load, the company says.

DIESEL-ELECTRIC SHOVEL—New P&H Model 1400-DE 4- to 4½-yd diesel-electric excavator provides electric-shovel efficiency independent of power-line service, according to Harnischfeger Corp., Milwaukee 14, Wis. Connected to a heavy-duty slow-speed diesel engine by a heavy-duty multiple V-belt, the unit's generator set with alternator is designed specifically for

The shovel shown above is rated at 1¾ yards. But day after day it delivers 2½ yards of coal with every pass.

These oversize loads are made possible by the *ESCO* coal loading dipper. With this specially designed lightweight bucket your shovel power goes into payload. Even with greater loads the shovel is not overloaded, for no power is wasted on useless dead weight of the bucket.

Digs Clean and Fast

You leave less coal in the pit and pick up less dirt with *ESCO* coal loading dippers. The flat lip cleans up coal without gouging into the bottom as do curved front dippers. Long sharp teeth, placed close together, have only enough pitch to insure good cleanup.

Built for Long Service

ESCO coal loading dippers are solid, substantial buckets, able to move a mountain of "shot" coal without trouble or excessive maintenance and lost time. They are fabricated of tough steel plate with teeth, tooth holders, door hinges and latching mechanism cast of long-wearing, shock-resisting manganese and high alloy steel. Tooth holders are webbed type, welded together to form a solid cast lip.

ASK FOR DETAILED INFORMATION

Your nearest *ESCO* representative will be glad to give you detailed information about coal loading dippers or about *ESCO* stripping dipper and dragline buckets. Or fill in and mail the coupon below. Electric Steel Foundry, 2179 N.W. 25th Avenue, Portland 10, Oregon, and 728 Porter Street, Danville, Illinois. Offices in Eugene, Oregon; Chicago; Honolulu; Houston; Los Angeles; New York City; San Francisco; Seattle and Spokane. In Canada, *ESCO* Limited, Vancouver, B.C.

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Please send additional information on: ☐ coal loading dippers; ☐ stripping dippers; ☐ stripping draglines.

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Address _____ Zone _____

City _____ State _____

Make and model of machines used _____

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Leading coal mining companies will testify that Lepley skips have met the rugged requirements at a minimum cost demanded in modern coal and material handling operations.

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For nearly 50 years we have designed skip loading equipment, rotary dumps, safety cages, sheaves, hoists and other allied units of mine machinery.

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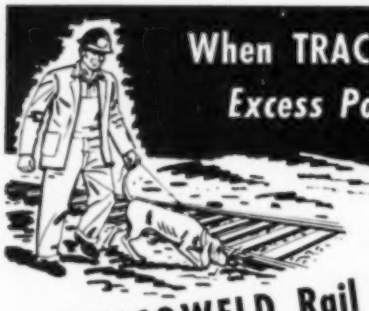
CONNELLSVILLE PENNA.



When TRACKING DOWN Excess Power Costs

Investigate MESCOWELD Rail Bonds

Faulty rail bonding is one of the most common causes of power losses in the mine. One of the first steps in perfecting your rail bonding systems is to install MESCOWELD Rail Bonds . . . for all MESCOWELD Rail Bonds have the cable attached to terminal by a patented flashwelding process to eliminate dead ends and assure perfect conductivity.

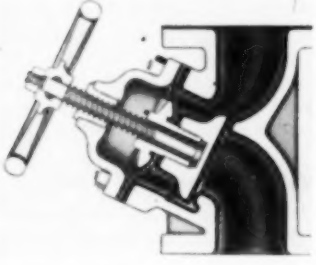
TYPE MB-F BOND

EIGHTEEN types of MESCOWELD Rail Bonds meet all bonding requirements. Immediate deliveries are made on all types. Write for details.

MOSEBACH ELECTRIC & SUPPLY COMPANY
1115 ARLINGTON AVE. PITTSBURGH 3, PA.
Phone: HEmlock 8332

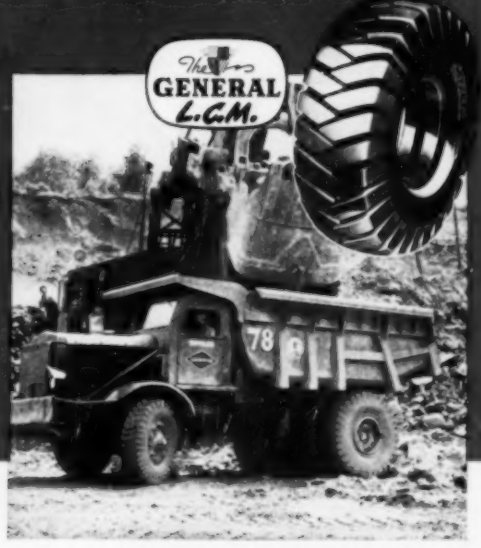
shovel service with a swing and crowd generator mounted in one frame. The cushioning characteristic of the P&H "Magnetorque" hoist drive, combined with that of the electrical power system of the crowd and swing, is said to relieve the diesel engine of the severe pull down in speed common to friction-type shovels. Bulletin X83-DE is available from Harnischfeger.

DIESEL-ENGINE PARTS—Weight reductions of from 6½ to 8% in Cummins diesel engines reportedly are possible with a new series of lightweight parts announced by the Cummins Engine Co., Inc., Columbus, Ind. Decrease in engine weight through use of these lightweight parts ranges from 151.4 lb. in Model HRB-600 to 193-8 lb. in Model HB-600. The total increased earnings of a particular trucker operating, for example, 125,000 miles per year with the Model NHBS-600 Cummins diesel engine would be $725.00, according to the company.



VALVES—Crane Co., 836 S. Michigan Ave., Chicago 5, has introduced a line of diaphragm valves utilizing a new design principle that limits the diaphragm function to sealing the bonnet only, resulting in a diaphragm of many times longer life. Other features reported by the company are positive shut-off of flow at all times, easier operation and quicker closing. Two types are available: plain iron valves from ½ to 2 in. with screwed ends, and from ½ to 4 in. with flanged ends; and neoprene-lined-and-coated valves with flanged ends only, in sizes ½ through 4 in.

OVERGROUND OR UNDERGROUND, GENERALS ARE BUILT TO LAST LONGER, WORK BETTER, FASTER, *at Lower Cost*



The *General H. C. T.* is specifically designed for most work on the road, some off. Perfect for trucks that work in and out of mines. More rubber on a stronger carcass disperses more of the load over the thicker traction tread. Wide, self-cleaning shoulders prevent spinning and side-slipping. With more rubber all around the *General H. C. T.* gives you more original miles, extra recap miles for more profit in every load.

You can depend on the tough, Top-Quality *General L. C. M.* to give long service under punishing treatment on razor-sharp mineral surfaces. The *General L. C. M.* is designed for trucks that must work 80% in the stripping area and 20% over-the-highway. Thick lugs form a self-cleaning traction tread. Tremendous shoulders prevent cutting, bruising, chafing and chipping. On the highway the L. C. M. rolls smoothly, steers easier.

General's new underground mining tire with extra wide, extra deep tread and tremendously thick, reinforced sidewalls give extra protection against snags, cuts and bruises—many extra hours of wear.

The GENERAL
TRUCK TIRE

THE GENERAL TIRE AND RUBBER CO. ★ AKRON, OHIO

MINE & INDUSTRIAL
DIAMOND
Supplies

Sales and Service on these
GENERAL LINE MINE SUPPLIES

Acker Core Drills
American Steel & Wire Cable
Austin Powder Co.
Atlas Lathes & Drill Presses
American Brattice Cloth
American Crayon Co.
Bearings—All Types
Coalmaster Drilling Equipment
Chicago Pneumatic Tools
Cincinnati Electric Tools
General Electric Line
Glidden Paint Company
Grey Rock Brake Lining
Lincoln Lubrication Equipment
Lincoln Welding Equipment
Marlow Pumps
McCarthy Overburden Horizontal & Vertical Drills
National Batteries
Page Drag Line Buckets
Plomb Tools
Pyrene Fire Equipment
Sheppard Diesels
United States Rubber & Belting

DIAMOND SUPPLY COMPANY, INC.
EVANSVILLE, INDIANA
MADISONVILLE, KENTUCKY

Operators say—"20% MORE EFFICIENT than average Storage Battery Locomotive"

THE GREENSBURG "MONITOR"

In use by Mt. Olive & Staunton Coal Company, Staunton, Ill.

FEATURES

Double knee-action; better trackability. Floating power; less power consumption. Quick acting footbrake, essential for quick stopping, especially behind loading machines. Brake shoes that follow wheel (due to knee-action). Adjustable Timken Bearings throughout. Huskiest transmission in any storage battery locomotive. Never leaks oil. Never add oil. Use regular auto oil; change every 6 months. Strong. Simple Design. Low maintenance. Backed by over 25 years of experience with Storage Battery locomotives.

The Greensburg "Monitor" Type is the first real improvement in storage battery locomotives. ENTIRELY NEW IN DESIGN. Its efficiency and economy have been proved in actual mine use. Operators report 20 to 25% more coal hauled than with other battery locomotive having the same battery capacity. From 6 to 10 ton capacities: track gauges 36" to 56½". Other locomotives from 1½ tons to 10 tons, 16" to 56½" track gauge.

MORE HAULING FOR LESS STORAGE BATTERY CAPACITY

THE GREENSBURG MACHINE CO.
Makers of Custom-Built Storage Battery Locomotives
101 STANTON ST., GREENSBURG, PA.

Industrial Notes

American Optical Co., Southbridge, Mass., has elected as president Walter A. Stewart, trustee and former vice president, succeeding George B. Wells, who resigned the presidency after serving a total of 12 years in that capacity. Mr. Stewart, active in the optical industry for 27 years, joined American Optical in 1935 and has been successfully distribution manager, general sales manager, vice president in charge of sales, and trustee.

Electric Steel Foundry, Portland, Ore., has licensed British American Industries, Ltd., for the manufacture of Esco dragline buckets in Britain, using English manganese steels and labor. While an increase in stripping has been an important factor in Britain's drive for greater coal production, the acquisition of American machinery has been handicapped by the lack of dollar exchange. Under the licensing arrangement, this equipment will be available without draining the dollar supply. In 1943, for example, Electric Steel Foundry shipped 216 buckets valued at $553,857 to England; 1947, 210 Buckets valued at $430,000. Production of one order, started in 1946 by Hadfields, Ltd., of Sheffield, sub-licensed by Bailimo, Ltd., British American's associate, is reported to have saved $400,000 in dollar exchange.

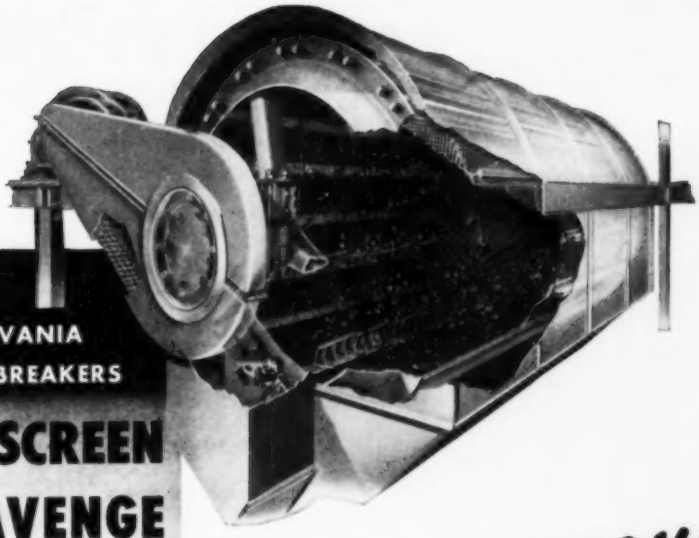
Vulcan Iron Works, Wilkes-Barre, Pa., has appointed J. F. O'Brien general sales manager and C. A. Netter general purchasing agent. Both Mr. O'Brien and Mr. Netter have been associated with the company in responsible capacities for a number of years.

International Harvester Co., Chicago, has appointed W. H. Kuhlman general supervisor of advertising and sales promotion, industrial power division, succeeding Donald Jones, who has been made general supervisor of refrigeration advertising and sales promotion. J. R. Roberts has been named supervisor of sales promotion, to succeed Mr. Kuhlman.

General American Transportation Corp., Chicago, has appointed Ben King Duffy as its representative to handle plate and welding and process equipment division sales in the Pittsburgh district. Mr. Duffy was formerly sales engineer for the Turbo-Mixer unit of General American.

Aurora Pump Co., Aurora, Ill., has announced that Ernest L. Abramson, development engineer for 20 years in the development and design of turbine-type pumps, has joined the company to participate in a broad development program involving new designs, sizes and applications for Aurora centrifugal and Apco turbine-type pumps.

Peter F. Loftus Corp., Pittsburgh,



PENNSYLVANIA
BRADFORD BREAKERS

CRUSH, SCREEN and SCAVENGE

ALL IN One OPERATION!

The Pennsylvania Bradford Breaker pays off big by making "full seam" mining both practical and economical. It crushes by gravity impact with continuous screening, producing a uniform product with maximum large sizes and few fines, and automatically removes tramp iron, mine timbers and other refuse—the headache of coal preparation. The development and improvement of Pennsylvania Bradfords has been a continuing process for more than forty years — in fact a number of installations made forty years ago are still giving daily service.

SINGLE ROLLS FOR COAL, ROCK AND REFUSE

Pennsylvania also makes Single Roll Crushers in two types—one for coal, the other for rock and refuse. They have a capacity up to 400 tons per hour, depending on size of material. These Steel-built machines have unusual compactness, require a minimum of headroom and floor space.

PENNSYLVANIA CRUSHER COMPANY

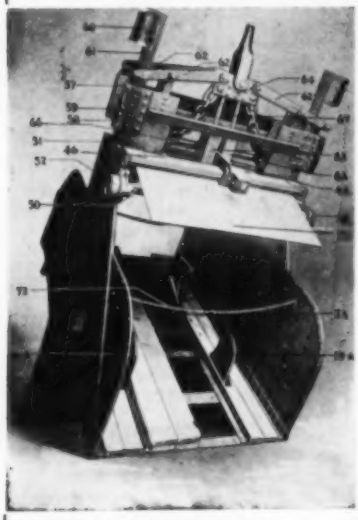
DIVISION OF BATH IRON WORKS CORPORATION

Liberty Trust Bldg., Philadelphia 7, Pa.

New York • Pittsburgh • Chicago • Los Angeles • Birmingham—Associated with Frazer & Chalmers Engineering Wks., London

Manufacturers of a complete line of crushing equipment • Hammermills • Single Rolls • Bradmills • Jaws • Gyracones Granulators • Impactors • Bradford Breakers

Lepley EQUIPMENT for COAL MINES



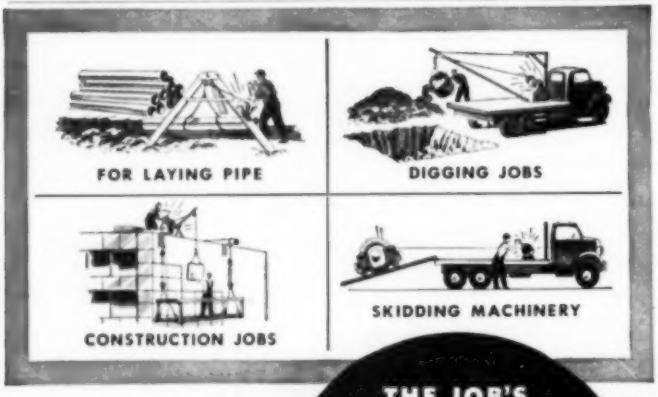
Simplicity—Ruggedness—Safety and Low Maintenance have made our Designs the Answer for Efficient Mining.

Cages

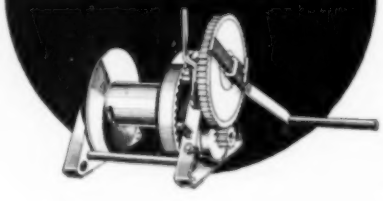
SKIPS
CAGERS
SHEAVES
ROTARY DUMPS
HOISTS
CONVEYORS
AND ALLIED EQUIPMENT

We have nearly 50 years' experience gained by direct contact with top ranking mining companies. Let us solve your material and man handling problems.

CONNELLSVILLE MFG. & MINE SUPPLY COMPANY
CONNELLSVILLE PENNA.



THE JOB'S A CINCH...WITH HANDIWINCH



One man lifts or pulls loads up to 10,000 lbs. with the AMERICAN HANDIWINCH. Simple, rugged, weighs only 95 lbs. Carries easily, sets up anywhere. Cut steel gears, two gear ratios. Has demountable tail yoke. Triple-width drum model also available. Sold everywhere; made by AMERICAN HOIST AND DERRICK CO., ST. PAUL 1, MINNESOTA.

ALSO MAKERS OF GENUINE CROSBY CLIPS AND AMERICAN BLOCKS AND SHEAVES.

Pa., has added to its staff H. E. Leilich, formerly mechanical engineer and power-plant project manager for the Rust Engineering Co.

General Electric Co., Schenectady, N. Y., will establish a new apparatus service shop and warehouse in Richmond, Va., late this summer, to provide better repair, maintenance and warehousing facilities for customers in Virginia. Reportedly containing the latest in machine tools and staffed by factory-trained men, the new shop will have warehousing facilities that are expected to appreciably reduce delivery time on many products.

Twin Disc Clutch Co., Racine, Wis., has appointed Wade A. Eskridge, formerly assistant district manager of the oilfield territory, service manager for the company.

Firth Sterling Steel & Carbide Corp., McKeesport, Pa., has appointed Jack W. Crawford manager of the newly created distributor-sales division. The company plans to expand its distributor-sales plans and increase its distributor representation as rapidly as new distributors can be secured in principal cities.

Atlas Equipment Corp., Pittsburgh, Pa., recently completed a new two-story building addition containing executive offices, larger quarters for sales, accounting and clerical staffs and an assembly room for group meetings. According to P. B. Reinhold, president of the company, the space vacated in the older building will be used for increased service-department facilities and special sales and service training courses, which will be made available to customers' employees as well as to Atlas personnel.

Detroit Diesel Engine Division General Motors Corp., has made several changes in its sales territories and staff. A. E. Bosetti has been appointed sales engineer in the New York-New England zone, which excludes New York City and Long Island but takes in the states of Pennsylvania, Delaware, Maryland and West Virginia. Paul Merkert takes over as sales engineer in the territory defined by Indiana, Illinois, Missouri, Kansas and the southeastern border counties of Iowa. Lauren H. Wells, formerly zone sales engineer covering West Coast distributors, will be responsible for sales to manufacturers in the midwestern states not covered in Mr. Merkert's assignment. R. V. Baxley, assistant to E. F. Bentley, manager of contractors equipment sales, is handling a field sales assignment in Ohio and Michigan's southern peninsula for the balance of 1949.

Fairmont Machinery Co., Fairmont, W. Va., has announced the addition to its staff of V. R. Graves, formerly associated with the Jeffrey Mfg. Co. Mr. Graves will make his headquarters at his residence, 1880 Wiltshire Rd., Huntington, W. Va.

Model 3-B-65 Auxiliary

Gear Splitters

FULLER'S NEW AUXILIARIES

For heavy grades and fast schedules . . . for heavy duty trucks in operations where plenty of gears are required, it's Fuller's new models 3-A-65 and 3-B-65 "gear splitter" auxiliaries.

For off-highway service, use Model 3-A-65 . . . splits unit transmission gears with its overdrive ratio . . . compounds low for heavy loads and tough going.

For highway work, use Model 3-B-65 . . . top speed in overdrive . . . overall reductions in low . . . more intermediate gear splits through either overdrive or low.

Fuller's gear splitters are designed for your job. Specify Fuller for replacement or on your new rigs.

FULLER MANUFACTURING COMPANY, TRANSMISSION DIVISION
KALAMAZOO 13F, MICHIGAN
Unit Drop Forge Division, Milwaukee 1, Wisconsin

WESTERN DISTRICT OFFICE (SALES & SERVICE—BOTH DIVISIONS)
1060 East 11th Street, Oakland 6, California

Fuller TRANSMISSIONS

NOTHING LIKE IT

for safe, fast cable wrapping!

Cables wrapped with RUBEROID INSULATING TAPE *stay* wrapped! And no wonder . . . it exceeds A.S.T.M. specifications by 300% in adhesiveness . . . by 26% in tensile strength . . . by 290% in dielectric strength! So *extra* thick, you need only *one* layer to insulate! Switch to RUBEROID INSULATING TAPE . . . start cutting cable maintenance costs today!

The RUBEROID Co.

QUALITY BUILDING MATERIALS

500 Fifth Avenue, New York 18, N. Y.

D-A Lubricant Co., Inc., Indianapolis, has appointed Warren Earl (Bud) Moore a sales and service representative in its Southern Illinois territory. Mr. Moore has worked in this territory, either as a mining plant engineer or a sales engineer, since 1936.

Armco Steel Corp., Middletown, Ohio, has named L. F. Reinartz and R. S. Gruver assistant vice presidents, and C. G. Davies, administrative assistant, operations division. Mr. Reinartz will continue to manage Armco's Middletown Division and, in addition, the company's coal mining division in West Virginia will report to him. Mr. Gruver was formerly administrative assistant, operating division, and Mr. Davies, assistant to vice president.

American Steel & Wire Co. will officially open a modern, new stainless-steel wire mill at its Waukegan, Ill., works with ceremonies June 23. Employing specially designed machinery the mill will have a capacity of 500 tons a month and make Waukegan a world center for the production of stainless-steel wire, it is reported.

Hewitt Rubber Division, Hewitt-Robins, Inc., Buffalo, N. Y., has appointed the Mine Service Co., Lothair, Ky., exclusive distributor in the counties of Perry, Letcher, Knott and Leslie, Kentucky. It also will represent the Robins Conveyors Division. The Bornell Supply Co., Inc., 180 E. Main St., Piqua, Ohio, has been named a distributor of Hewitt industrial rubber products in Piqua and the surrounding territory. Hewitt Rubber also has appointed Hall S. Derkin a sales representative in the Chicago area.

Continental Gin Co., Birmingham, Ala., has appointed Shook & Fletcher Supply Co., Birmingham, Ala., exclusive sales representatives in Alabama for underground mining equipment.

Gar Wood Industries, Inc., Wayne, Mich., has appointed the Peerless Mfg. Co., 4300 Bluffton Road, Ft. Wayne, Ind., as an authorized distributor of the products of the Wayne Division.

Ward Leonard Electric Co., Mt. Vernon, N. Y., has moved its general office from the factory building at 31 South St. to a new office building at 115 S. MacQuesten Parkway. The new facilities involved executive and sales offices and the company's headquarters for all operations.

Baker Industrial Truck Division, Baker-Raulang Co., has moved its general offices, including the purchasing, sales, engineering and service departments, to 1250 W. 80th St., Cleveland 2, Ohio. The division's manufacturing operations also will be moved to the 80th Street location within the very near future.

Leece-Neville Co., Cleveland, Ohio, has announced plans for expansion and improvement of its facilities that

How Easy, Now, to Join and Repair Belts!

1

A hammer . . . block of soft wood . . . Bristol's Belt Lacing. Hammer fastener through belt.

2

Using wood block as a back-up, flatten the projecting prongs.

3

Perfect job! Ends securely joined . . . tears repaired!

Keep these fasteners handy for quick, strong, permanent repairs.

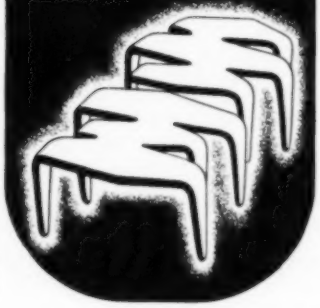
Order from your distributor

THE BRISTOL COMPANY

Mill Supply Division

139 Bristol Road, Waterbury 91, Conn.

BRISTOL'S BELT LACING



DUST PROOFING

FREEZE PROOFING

PERMANENT ODORLESS TREATMENT

BETTER STOKER FEED

CLEAN HANDLING

LESS WINDAGE LOSS

DUST-PROOFING WITH

PERMATREAT COAL SPRAY

MEANS *Cleaner* YEAR 'ROUND DELIVERIES

Permatreat is the answer to more deliveries of coal in summer, for housewives know dust-proofed coal won't cause additional housecleaning. More summer sales mean more time for fall and winter deliveries and thus greater profits through additional deliveries. You'll find domestic consumers "sold" on coal as a fuel when it's dust-proofed.

Ashland Permatreat Coal Spray can be furnished in low, medium and high viscosity ranges to treat all grades of coal. Talk it over with an Ashland representative. He'll gladly give you the facts and help with any preparation problem. Write today!

ASHLAND OIL & REFINING COMPANY
Ashland, Kentucky

dustproof coal TODAY

for sales leadership TOMORROW!

"Clean" coal tells its own story to dealers *and* householders . . . of fuel handled with virtually none of the dirt, dust and sifting, clinging *soil* that so often makes other kinds of fuel look more desirable.

Wyandotte Calcium Chloride does just that for you—it *dustproofs* coal, giving in a special, *new* sheen that stamps it as clean . . . and gives it a *sales appeal* that no other treatment can.

Write for information on Wyandotte Calcium Chloride—the safe, *reliable* agent for dustproofing coal.

Wyandotte Chemicals Corporation
MICHIGAN ALKALI DIVISION
Wyandotte, Michigan

Send me literature and further information about the uses and advantages of Wyandotte Calcium Chloride.

Name .....
Address .....
Title .....

Wyandotte
REG. U. S. PAT. OFF.
CALCIUM CHLORIDE
WYANDOTTE CHEMICALS CORPORATION
Michigan Alkali Division, Wyandotte, Michigan

are expected to greatly improve production efficiency. The company's old plant reportedly has been sold and its other plant purchased during the war will be enlarged with the construction of another building adjacent to it. Another building nearby also will be retained and expanded for the design and technical departments and engineering laboratory.

Eutectic Welding Alloys Corp., New York, has put into production its recently acquired Flushing, N. Y., plant and is planning additional buildings that will complete the company's plans for expansion of productive facilities by mid-summer. Occupying approximately 100,000 sq ft, the new plant houses a foundry, metal rolling and drawing plant, several large extrusion presses for producing coated electrodes, and alloy cutting facilities. It will also contain a complete gas-welding division, plus special control and research laboratories.

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Trade Literature
Available Without Charge on Request to the Manufacturer

SWITCHGEAR—Allis-Chalmers Mfg. Co., 968 S. 70th St., Milwaukee, Wis. Bulletin 18B6376A covers construction features of A-C modern-metal-enclosed low-voltage switchgear and drawout air circuit breakers, with a chart supplying dimension and typical panel data on the switchgear, available in current ratings of 15 to 5,000 amp, interrupting ratings to 100,000 amp, 250 volts dc and 600 volts ac.

CONVEYOR BELTING—B. F. Goodrich Co., Akron, Ohio. Catalog section features the Goodrich Cord belt, fabric-constructed belting and belting for special services, describing and illustrating major features of the line.

DRAGLINE BUCKETS—Page Engineering Co., Clearing Post Office, Chicago 38. Revised edition of "How to Get the Most Out of a Page Automatic Dragline Bucket" offers detailed information on dragline operations, including proper selection, operation and maintenance of Page buckets.

CIRCUIT PROTECTION — Mines Equipment Co., Dept. 2, 4235 Clayton Ave., St. Louis 10, Mo. Bulletin SCC-101 describes dust-resistant and permissible types of safety circuit centers, with details of part numbers and dimensions of boxes.

PORTABLE BELT CONVEYORS—Barber-Greene Co., Aurora, Ill. Bulletin 363 covers the application, features and construction of the all-purpose Model 363 portable belt conveyors, available in lengths of 25, 30 and 35 ft, with plain or cleated belts.

ROLLER CHAIN — Atlas Chain & Mfg. Co., Castor & Kensington Aves., Philadelphia 24. Catalog describing safety, service and maintenance features of Atlas roller chain includes engineering data, cross-sectional drawings, dimensions, specifications and prices.

DIESEL ENGINES — Mack-International Motor Truck Corp., 350 Fifth Ave., New York 1. Catalog featuring Mack's newly designed End 672 four-cycle 6-cylinder, 150-hp diesel engine, covers design, operating and application features and specifications. Another new Mack publication, a booklet

CARLON E
Flexible PIPE

If WATER is Your Problem CARLON E is Your Solution

• For water removal or supply in mine operation Carlon E Flexible Pipe meets every requirement with economy and efficiency.

Acid and alkali resistant, Carlon E will not corrode or deteriorate. It is impervious to practically all inorganic chemicals and completely free from any electrolytic corrosion—it cannot form a galvanic couple. Light in weight and flexible it pays for itself in low cost installation and maintenance.

Furnished in standard pipe sizes from ¼" to 6" diameter. Adequate stock at distributors and factory assures pipe when you want it.

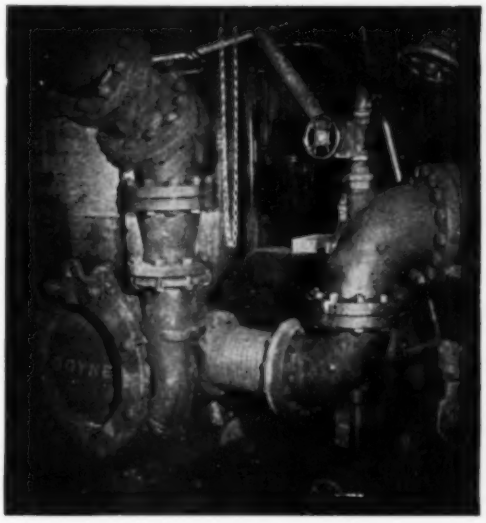
Write for quantity prices and further information.

SPECIAL TRIAL OFFER

Carlon E is furnished in 200 ft. coils for easy handling. To enable you to give it a practical trial in your mine we will furnish one coil of the 2" size at the 2000 ft. quantity price of 40c per foot or $80.00, on condition that if it does not prove entirely satisfactory within one year it can be returned for full credit. *ORDER TODAY.*

CARTER
PRODUCTS CORPORATION
10223 MEECH AVE. • CLEVELAND 5, OHIO
Manufacturers of
EXTRUDED PLASTICS
In Canada: Micro Plastics, Inc., Acton, Ontario

GOYNE PROCESS PUMPS



A Sand Pump is only a link in a chain in a coal washing plant, but it can be a strong link if it embodies the following features as does the Goyne.

1. Ease of inspection of all wearing parts. All internal portions are immediately accessible after removing only the rear head of the pump. No suction or discharge piping is disturbed.

2. The one packing box of the pump subjected only to suction pressure and is readily kept clean by a low pressure clear water line. Long packing and shaft sleeve life is assured.

3. Impeller clearance is adjusted *while the pump is running*, insuring constant pump capacity so essential for uniform washing.

4. There are twenty-eight possible nozzle assembly combinations for each standard pump. Washery designers like this "adaptability feature" as it helps them out of tight places and simplifies piping.

5. We carry the spare parts stock. Order your replacements when needed. Reduce your inventory by using Goyne Process Pumps.

All inquiries receive prompt and careful attention.

THE GOYNE STEAM PUMP CO.
ASHLAND, PA.

Free Book gives "INSIDE FACTS"

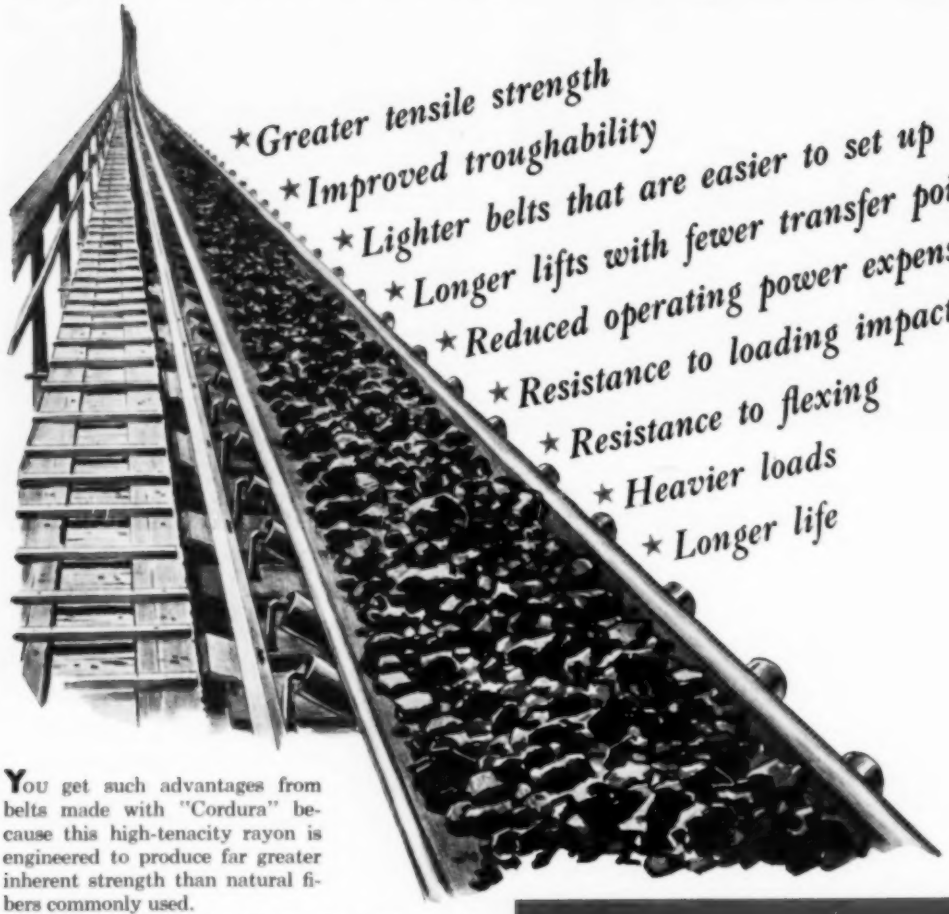
on how aluminum paints are formulated—how to choose and use them. Alcoa does not make paint, but we want you to have the information contained in this booklet. Tells how you can purchase a ready-mixed aluminum paint that will give unequaled protection of steelwork—another type that gives best results on weather-exposed wood. Learn why you may not get best results from just "any" aluminum paint! For your copy, or for specific advice on your paint problems, address PAINT SERVICE BUREAU, ALUMINUM COMPANY OF AMERICA, 642-F Gulf Bldg., Pittsburgh 19, Pa.

ALCOA

Buy aluminum paint from suppliers who display the Alcoa shield on the brand they sell. It is a symbol of quality, indicating that their aluminum paints are made with

ALCOA ALUMINUM PIGMENT

Here's how Du Pont "Cordura" Rayon can improve your conveyor belt performance



★ *Greater tensile strength*
★ *Improved troughability*
★ *Lighter belts that are easier to set up*
★ *Longer lifts with fewer transfer points*
★ *Reduced operating power expense*
★ *Resistance to loading impacts*
★ *Resistance to flexing*
★ *Heavier loads*
★ *Longer life*

You get such advantages from belts made with "Cordura" because this high-tenacity rayon is engineered to produce far greater inherent strength than natural fibers commonly used.

A carcass reinforced with Du Pont "Cordura" Rayon makes possible a thinner, lighter belt that's easier to work with. And "Cordura" packs tensile strength into long-lift belts—yet provides outstanding troughability.

Du Pont "Cordura" High Tenacity Rayon means better belt performance and greater economy. Next time you need a conveyor belt, ask your supplier for a belt that's sinewed with "Cordura." And write today for more information on the use of "Cordura" in conveyor belts. Address Room 4727, Rayon Division, E. I. du Pont de Nemours & Co. (Inc.), Wilmington 98, Delaware.

DU PONT "CORDURA" HIGH TENACITY RAYON

DU PONT

REG. U.S. PAT. OFF.

For RAYON...for NYLON...for FIBERS to come...look to DU PONT

entitled "Understanding the Automotive Diesel," written in layman's language, provides a brief history of the diesel engine and discusses diesel fuels, various combustion systems, two-stroke and four-stroke engines, fuel injection, engine control, diesel economy, engine starting and stopping and other general information.

AIR HOSE — New York Belting & Packing Co., 1 Market St., Passaic, N.J. Bulletin offers information on company's line of air hose for welding, underground mining, pneumatic tools and general air-drill service, with data on applications, construction and specifications.

CONCRETE-FORM LINING — U. S. Rubber Co., Rockefeller Center, New York 20. Manual on Hydron absorptive form lining used in the construction of smooth durable concrete surfaces discusses methods of installation, relative costs, applications and specifications.

MAGNETIC MOTOR CONTROL — Trumbull Electric Mfg. Co., Plainville, Conn. Bulletin announcing a new line of magnetic motor controls designed to provide full protection against damage from overload and under-voltage to ac motors up to 50 hp presents complete product data, including types of disconnects, reversing starters, non-reversing starters, reversing contactors, non-reversing contactors and combination magnetic starters, with specifications, dimensions and prices.

MATERIALS HANDLING—Kwik-Mix Co., Port Washington, Wis. Catalog describing the Moto-Bug, a new power wheelbarrow, illustrates various attachments and its many applications, with schematic diagrams and engineering specifications.

GAS WELDING—Air Reduction Sales Co., 60 E. 42d St., New York 17. Catalog on gas-welding supplies, the first of a projected series of 10, describes 19 gas-welding rods and eight fluxes, with information on silver brazing alloys and carbon rods and carbon plates.

SCALES—Yale & Towne Mfg. Co., Philadelphia Division, Philadelphia 15. Bulletin P1135 offers details on the new Load King scale weight printer, with tables of available models and printing capacities, dimensions, operating and construction features.

COPPER WELDING—Electric Railway Improvement Co., 2070 E. 61st Place, Cleveland 3, Ohio. Catalog describing the Cadweld process for welding copper to either steel or copper, with no outside source of heat required, describes and illustrates the various types of welders, together with equipment requirements for formed terminal connections, connections to horizontal and vertical surfaces, T connections and ground connections.

AIR AND WATER HOSE — B. F. Goodrich Co., Akron, Ohio. Catalog section on Goodrich line of air hose features the company's "Highflex" brand, a recently introduced improved type said to be 50% lighter than conventional air hose of the same working pressure, and also describes and lists specifications on all other types of air hose the company manufactures. Separate catalog section illustrates and describes the Goodrich line of water-suction hose, with specifications, application and fittings data.

DIESEL ENGINES—Shepnard Diesel Engines, Hanover, Pa. Bulletin D-200 illustrates and describes construction and operating features of various diesel power units, with performance and specification data.

STEEL—Joseph T. Ryerson & Son, Inc., Box 8000-A, Chicago 80. Bulletin describing Nitralloy, a special alloy steel for extreme wear and abrasion resistance, includes a table of Nitralloy compositions, hardness curves, mechanical properties, information on nitriding and heat treatment and typical applications.

PILING RENTAL—L. B. Foster Co., P. O. Box 1647, Pittsburgh 30, Pa. Bulletin F120 3-49 lists advantages of the Foster piling rental service and outlines how the rental service is conducted, plus a complete listing of every Foster product.

ROOF MAINTENANCE — Stonhard Co., 1306 Spring Garden St., Philadelphia 23. Folder describes use of Stonhard plastic or liquid roof resurfacers, applied with brush or trowel, to make any type roof weatherproof and long-lasting.

SAFETY POSTERS—Hy-Test Safety Shoe Division, International Shoe Co., 1509 Washington Ave., St. Louis 3, Mo. New series of safety posters stressing the value of safety shoes to workers, the work of an English artist, F. Kenwood Giles, well-known in Britain and the dominions for his safety and advertising posters, is available to safety directors and others who can make use of them.

AUTOMATIC OILERS — Trico Fuse Mfg. Co., 2948 N. 5th St., Milwaukee 12, Wis. Bulletin illustrates actual job installations of visible automatic oilers, including constant-level, wick, thermal and gravity-feed types in a wide range of applications.

ARC WELDERS—Hobart Bros. Co., Troy, Ohio. Catalog containing illustrations, descriptions, dimensions and specifications covers the complete line of "Simplified" arc welders, generators and a high-frequency stabilizer attachment.

ELECTRODES—Lincoln Electric Co., Cleveland 1, Ohio. Bulletin 465 provides data on application and properties of electrodes for welding cast iron. Bulletin SD4 lists the various Lincoln field service shops throughout the country.

HEAVY - MEDIA SEPARATION — Western Machinery Co., 760 Folsom St., San Francisco 7. Bulletin P-11-S-1 covers application, design and operating characteristics of Wemco equipment for heavy-media separation. Engineering data, dimensions and specifications are included, along with cross-sectional drawings.

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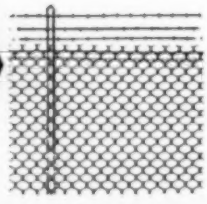

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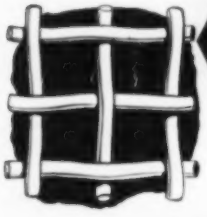

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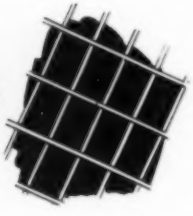
For safety guards... around machinery



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A type and size for every wire rope need

Mine Rails and Accessories available in Western States

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The Searchlight Section is the classified advertising appearing in each of these papers. You can use it at small cost, to announce all kinds of business wants of interest to other men in the fields served by these publications. It is the regular meeting place of the man with a miscellaneous business need and the men who can fill that need.

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That's right—your single order can call for ball, roller and thrust bearings, oil seals and specialties manufactured by all 33 "big names". That single order will be filled entirely at one source—your local West Virginia Bearings warehouse. Make it your regular bearing headquarters . . . where you can be sure of a wider choice from stock, and complete, unbiased bearing information.

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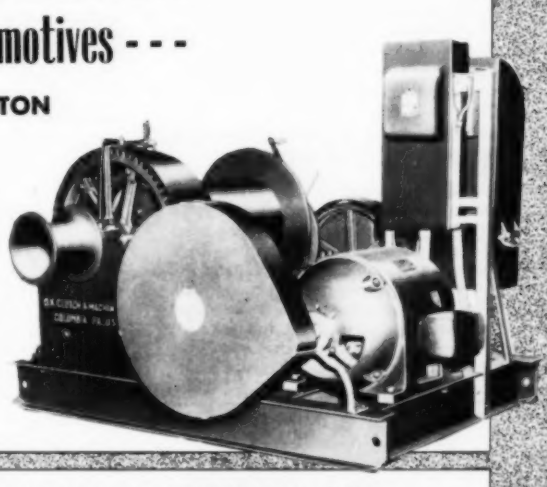
O.K. hoists are built to fit your specifications. We will gladly discuss any special problem—or supply you with information on the complete line of O.K. hoists, compressors or the portable elevator.



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OUR PRODUCTS HAVE BEEN GIVING SATISFACTION SINCE 1903

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Use it to *SPREAD* the national debt!

WITH MANAGEMENT BACKING, PAYROLL SAVINGS PLAN CAN HELP BUSINESS AND NATION

In 19,000 companies, the Payroll Savings Plan (for the regular purchase of U. S. Savings Bonds) has made employees more contented in their jobs—has cut down absenteeism—has even reduced accidents!

In addition, of course, the Plan builds financial security for each participant. Each Bond pays $4 at maturity for every $3 invested.

But the Plan has other, far-reaching benefits—to business and to the nation—which are equally important to you.

SPREADING THE NATIONAL DEBT HELPS SECURE YOUR FUTURE

The future of your business is closely dependent upon the future economy of your country. To a major extent, that future depends upon management of the public debt. Distribution of the debt as widely as possible among the people of the nation will result in the greatest good for all. How that works is clearly and briefly described in the brochure shown at the right. Request your copy—*today*—from your State Director of the Treasury Department's Savings Bonds Division.

WHY EXECUTIVE BACKING IS VITAL

Employees still want the benefits of the Payroll Savings Plan. In fact, they *need* the P. S. P., because banks don't sell Bonds on the "installment plan"—which is the way most workers prefer to buy them. But wartime emotional appeals are gone. Human nature being what it is, the success of the Plan in your company is liable to dwindle unless a responsible executive keeps it *advertised*. The *reasons* for promoting it are as important as ever—to you, your company, and your country.

So—today—*check up* on the status of the Payroll Savings Plan in your company. *Act* on your responsibility to see that it is vigorously maintained.

The State Director will gladly help.

"The National Debt and You,"

a 12-page pocket-size brochure, expresses the views of W. Randolph Burgess, Vice Chairman of the Board of the National City Bank of New York, and Clarence Francis, Chairman of the Board, General Foods Corporation. Request your copy from the Treasury Department's State Director, Savings Bonds Division.

The Treasury Department acknowledges with appreciation the publication of this message by

COAL AGE

This is an official U. S. Treasury advertisement prepared under the auspices of the Treasury Department and the Advertising Council

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Correctly sized Magnetite for sink-float treatment of coal or other minerals. Standard grinds;

Grade A—Approximately 100 mesh with 60 to 70% passing 325 mesh.

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Other sizes to order.

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Over 50 years grinding experience.

Get This New 20-page Bulletin FREE

Illustrates and describes many modern types of cages and skips built for mining companies throughout the world.

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CORE DRILLING —anywhere!

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PLATE FASTENERS FOR CONVEYOR BELTS

Make strong dust-tight, water-tight joints in belts of any width. Special design spreads tension uniformly across belt, allow natural troughing of belt and assures smooth operation over flat, crowned or take-up pulleys. Sizes for belts of from 1/4" to 1 1/2" thickness. *Write for Catalog Sheet.*

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NO SIDETRACKS ON THE "AIR EXPRESS" WITH

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FAMOUS FIREPROOF

BRATTICE CLOTH

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Fulton Brattice Cloth comes in both standard and extra-heavy weights and in widths from 36 to 96 inches. It successfully resists moisture, mildew, fungus, and rot. A sturdy, cloth marker on each easy-to-handle uniform 50-yard roll gives full specifications of the roll.

Ready for immediate shipment through your supply house or from your nearest Fulton branch.

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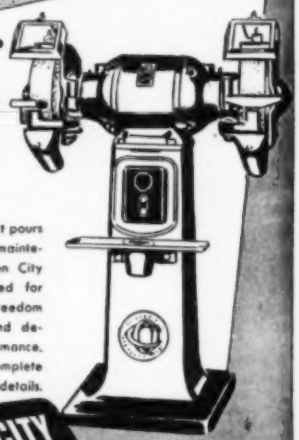
cut tool costs...

with rugged **QUEEN CITY GRINDERS**



It takes a top-quality grinder to stand up under the heavy work that pours through a mine maintenance shop. Queen City Grinders are noted for their durability, freedom from downtime and dependable performance. Send for catalog complete with prices and details.

QUEEN CITY MACHINE TOOL CO

241 E. 2nd St.
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One of a series *of messages to help you increase your understanding of business paper advertising, and its effect on your job.*

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PEOPLE WHO REGARD advertising as an economic waste are fond of pointing out that it's the *customer* who pays the bill.

And they are right.

The customer also pays for your power supply, your production tools, your plant maintenance, your salaries. All these are figured into the price of your product, along with the cost of your advertising.

Does this mean that the customer pays *more* for your product because it is advertised? Not at all. No more than he pays anything "extra" for the machinery on your production line!

The truth is, your production tools enable you to *reduce* your manufacturing cost-per-unit — and hence your price to the customer.

Advertising works the same way. For it is simply the application of assembly-line methods to the *manufacture of a sale.*

How can selling be mechanized? Just consider the five basic steps —

1. **Seeking out prospects**
2. **Arousing their interest**
3. **Creating a preference for your product**
4. **Making a specific proposal**
5. **Closing the order**

Advertising performs the first three of these jobs. And it performs them *far more economically* than any other means, leaving your salesmen free to concentrate their valuable time on the two jobs they alone can do, and do best.

As with any other capital investment, the yield from advertising depends on how *efficiently* it is put to work. But this much you can be sure of: nowhere does advertising work more efficiently than in business papers, with their tremendous concentration of hand-picked readers. Nowhere will your advertising dollar go so far toward reducing the cost of *manufacturing a sale!*

COAL AGE

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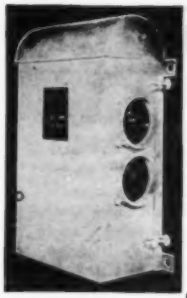

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For Main Haulage • Prevent Collisions
Save Trip Time

A two wire cable connects two or more signals together into one block. Only one signal can show proceed on the entrance of a trip, all other signals show stop.

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- Easy to Install.
- Write for Catalog.

NACHOD & UNITED STATES SIGNAL CO.
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Thrown by Motorman

Operates Switch Safely • Saves Time and Money

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Write for Catalog
CHEATHAM ELECTRIC SWITCHING DEVICE CO.
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4780 Crittenden Drive, Louisville, Ky.

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COAL MINING SCREENS
Manufactured exactly to your specifications.
Any size or style screen, in thickness of steel wanted with any size perforation desired.
We can promptly duplicate your present screens at lowest prices.
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FOR HEAVY CONVEYOR AND ELEVATOR BELTS OF ANY WIDTH

Flexco HD Fasteners make a tight, butt joint of great strength and durability . . . distribute the strain uniformly. Operate smoothly over flat, crowned or take-up pulleys. Made of steel, Monel, Everdur and Promal.

Flexco Rip Plates are for repairing and patching damaged belts.

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4638 Lexington St., Chicago 44, Illinois

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Order From Your Supply House

"Sutton" SAND DRYING STOVES

The Standard for Over Forty Years

Burns Any Type of Fuel

The "Sutton" Sand Dryer may be fired with any type of fuel. While most "Sutton" Sand Dryers are equipped to burn coal, they can be furnished with burners for natural gas or fuel oil.

"SUTTON" FEATURES

- Simple in operation
- No skilled labor necessary
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- Topmost efficiency

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In these three books you have a practical, always-on-the-job guide that will help you solve the problems you face every day, show you what to do, tell you why it should be done.

Beard's

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3 Volumes—$8.25, Payable in Three Easy Installments

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Can you answer these questions—

What is meant by splitting the air current and what are the advantages derived from such methods?

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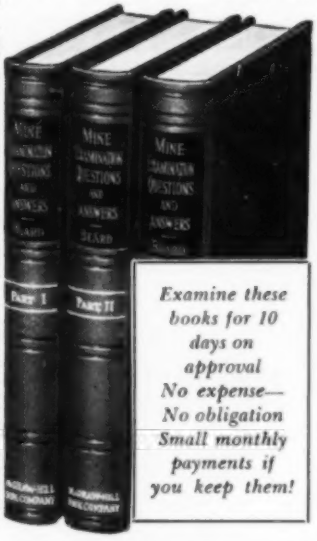

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Westinghouse
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Stocked and Distributed By NATIONAL MINE SERVICE COMPANY
Beckley, West Virginia

Westinghouse Air Brake Co.

Industrial Division: Wilmerding, Pa.

WANTED
Superintendent-Manager

For large productive strip mine in West Virginia. Good salary with bonus arrangement for right man. Write giving qualifications and experience.

P 9002, Coal Age,
330 West 42nd St., New York 18, N. Y.

REPLIES (Box No.): Address to office nearest you.
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CHICAGO: 520 N. Michigan Ave. (11)
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FOREIGN WORK. Several coal-mining engineers experienced with modern mining methods in pitching seams. One to three-year contracts. Specify fully experience and salary wanted. P-8979, Coal Age.

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For Sale, Truck Mine.

No. 6 vein extra good coal. 2000 acres available. Excellent truck trade or can contract entire outfit. Steam hoist. Mine in very good condition. Contact Harley W. Fielder, 316 W. 8th St., Bicknell, Ind.

For Sale, Modern Coal Tipple

and Loading Ramp complete with McLanahan and Stone Crusher, picking table, vibrating screens and 100 ton storage bin. Capacity 500 tons daily. This plant is located at Kilgore, Kentucky, near Ashland, Kentucky, on the C&O Railroad, together with large acreage of coal leases with stripping rights and the plant is ready for immediate operation, will sell complete for $15,000.00 or will sell tipple separate which can be easily torn down and removed to some other location. For further details write to Box 138, Middlesboro, Kentucky.

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MINING ENGINEER, 31, married, 2 children. Experienced in both underground and strip mining of coal. Graduate Mining Engineer. Desire permanent connection with responsible company as engineer or position where engineering background is essential or beneficial. Available July 1st. PW-9034, Coal Age.

RESPONSIBLE OLD ESTABLISHED METALLURGICAL EXPORT FIRM

Desires connection with first class bituminous coal mines to handle their export as agent or on other exclusive basis.

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8 car daily production. Two Rail Tipple Chutes, Screens, Western Maryland Siding. 210 Acres, 5 Seams Coal, 36" to 62" Jeffrey Cutting Machines, good haulage. Low insurance rate.

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All of above to include usual accessories and guaranteed to be in A-1 condition. New in 1943.

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2—Goodman, type G 15 B74 Shaker Conveyor with type EL—1½ G duckbill. Complete with (1)—30-L-17 Elevating Chain Conveyor, 250 volts D. C.
1—15 Ton Capacity Track Scale.

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Textolite Laminated Plastic Pipe manufactured for the Government by General Electric Co. and now surplus. Unused. Resists the effects of corrosive waters and atmospheres, chemical salts and solutions, solvents, gasolines, etc. A high pressure pipe, 5" O.D. with ¼" wall. Offered below iron pipe prices, although original cost and present manufacturer's price is several times that of iron pipe. Available with standard threads and couplings of similar material. Prices, specifications and technical data, with a sample of material free on request. This material will stand the most rigid technical examination.

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ELECTRIC STRIPPING SHOVEL FOR SALE

Bucyrus 200-B equipped with crawlers and 10 yd. dipper for loading coal. Good condition, will make excellent 5 yd. stripping shovel.

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800 KW West. 550 v.—710 HP 2300 v. Syn.
450 KW G.E. 275 v.—2300 v. Syn., 720 RPM
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150 KW West. 125-225 HP Ind. 2200/440/220 v.
100 KW West. 275 v.—150 HP Syn 440/220 v.
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35 KW G.E. 125 v.—50 HP Ind. 440/220 v.
10 KW 125 v.—15 HP Master 440/220 NEW.

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200 HP. West. CW 2300/3/60 600 RPM S.R.
300 HP. G.E. I M 2300/3/60 450 RPM S. R.
150 HP G.E. RT 220/440 v., 695 RPM.
100 HP G.E. Type I K 2200/3/60 600 RPM S. C
150 HP. G. E. Syn. 220/440/3/60 600 RPM.
150 HP West. CS 220/440/3/60 500 RPM S.C
100 HP. Al. Ch. ARY 2200/3/60 600 RPM S.R.
100 HP. G.E. IM 440/220/3/50 450 RPM S.R.
60 HP WEST. CS 220/440/3/60 1200 RPM S.C.
150 KW Triumph 250 v. 600 RPM Gen.
150 KW G.E. 550 v. RC 1150 RPM Gen.
125 KW West. SK 250 v., 600 RPM Gen.
100 KW West. SK 250 v., 600 RPM Gen.
30 HP West. SK 93. 230 v. 1750 RPM.

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3—250 KVA G.E. H—K-S 2300/4000—220/440 v.
1—100 KVA All. Ch. 2200 v.—220 v.

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Haulage and Gathering

20/25 Ton G.E. outside 4" armorplate frame, steel tires, 3HM, 824 BB Motor, 125 HP. each, 500 v., 42 or 44" Ga.

15 ton Jeff. MH110 Std. R.R. Gauge.
13 Ton West. 36 or 40" Ga., 250 v.
10 Ton Jeff. 250 v. 36/42" Ga. MH 110 Motors.
8 Ton Goodman 500 v. 42/44" Ga.
8 Ton Goodman 250 v. 42/44" Ga.
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6 Ton West. 250 v. 904 Motors 36" Ga.
3-5 Ton Goodman 30 B 250 v. 42" Ga. Gath.
2—4 Ton Goodman, 250 v., 42" Ga., agl. motor, gath.

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6 Ton G.E. Permissible BB Motors, 36/44" Ga.
5½ Ton Ironton Type A 36/45 Ga.

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2—115 EJ Goodman Universal, 220 v., 7½" bars.
2—12 DA Goodman 250 v. DC 6½ to 7½' bar.
2—35 B Jeffrey, 250 v., 6½ to 7½' bars.

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300 HP Lidgerwood sgl. fixed drum, 6½' dia., 3' face. 3" Ranger grooved—1¼" cable, 300 HP 2300/4000/3/60 Westgh. CW.

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75 HP Mead Morrison sgl. fr. drum—AC Motor.
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PROMPT SHIPMENT ON ALL SIZES A. C. AND D. C. REBUILT MOTORS.

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750 KVA UNAFLOW ENGINE GENERATOR SET, right-hand, consisting of
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50 ton Whitcomb diesel elec. switching locomotive. New 1942.
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GUARANTEED EQUIPMENT—IMMEDIATE SHIPMENT FROM LARGE STOCKS AT REDUCED PRICES

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15 ton scales	$ 460.00
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33 ton, 34'x10' scales	1650.00
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50 ton, 45'x10' scales	2295.00
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All scales complete with structural steel weighbridge. Replacement parts for most all makes of scales.

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Stoker coal crusher	$ 474.00
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50 to 100 ton capacity	575.00
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VIBRATING SCREENS
We have approximately 100 machines on the floor, ranging in screening area sizes from 2'x5' to 5'x14' with 1 to 5 decks. Eccentric weight or positive throw eccentric shaft types. Prices range from $395.00.

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Troughing—picking tables—Lengths from 10' to 500', widths to 60". If you want to build your own we have all parts, including standard sections, head and tail pulleys, belt takeups, drives, idlers, etc.

TROUGHING AND PICKING TABLE IDLERS
All steel construction, no cast-iron, interchangeable with other well-known makes of idlers. Precision ball bearings with alemite fittings. Bearings are replaceable. Shafts run clear through, and no bearing adjustments are required. Easy to start and will run in cold weather. No grease seals, but alemite fittings. Ball races are rust proof; maintenance is negligible.

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16" belt	$19.00	14" belt width	$18.50
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36" belt	23.00	30" belt	22.00
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30" belt	$ 9.00	24" belt width	$ 8.25
42" belt	10.50	36" belt	9.75
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New and Rebuilt Motors—Speed Reducers—Sheaves—Conveyor Belting.

Drill presses—bench and pedestal grinders vises—portable drills—wood and metal cutting bandsaws—acetylene and electric welding, cutting and burning outfits, etc.

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1—Card Iron Works Rock Car, 90 Cu. Ft. Capacity.

VIBRATING SCREENS
1—3' x 6' Single Surface Tyler-Niagara, V-belted to 5 HP. AC Motor.
1—3' x 6' Single Deck Plat-O, Flat Belt Drive to 2 HP.

INGERSOLL-RAND MOTOR MOUNTED PUMPS
2—2RV-1—100 GPM, 25' Head.
1—ORVF-1—20 GPM, 50' Head.
3—RV-3—120 GPM, 55' Head.
1—RVH-7½—150 GPM, 120' Head.
1—1½RVH-10—125 GPM, 200' Head.
4—2RVH-15—200 GPM, 150' Head.
1—3RVH-25—400 GPM, 180' Head.

MAGNETIC PULLEYS
1—24" Conveyor, 5'6" Centers, equipped with 18" dia. x 26" face Ding's Magnetic Pulley, with charger. Unit driven by 1 HP 3 ph. 60 cy. Gen. Elec. Gear Motor.
2—24"x26" Ding's Magnetic Pulleys, 250 volts DC, without chargers.

FLIGHT CONVEYORS
1—8" Flight Conveyor—65' Long.
1—10" Flight Conveyor—30' Long.
2—24" Flight Conveyors—50' Long.
1—24" Flight Conveyor—85' Long.
1—30" Flight Conveyor—150' Long.

BELT CONVEYORS
1—24", 15' Long, with Ding's Pulley.
1—30", 30' Long, with 2 H.P. Gearhead Motor. New belt.
1—30", 70' Long, with driving mechanism.

COAL CUTTERS
1—Sullivan CE-7 AC Short Wall, complete with Tip-turn Truck and Reel.
New CE-7 Cutting Machine Parts.

COAL WASHING EQUIPMENT
2—Rheolaveur Launders, complete with Steel Supporting Frame.
1—60" Dia. Dividing Table, direct connected to 2 HP. DC. Motor.
1—Galigher Auto. Sampler with adjustable stroke and direct connected to a 1/6 HP. Motor.
1—12' x 10' Steel Hopper Bin.
1—70' x 12' Dorr Thickener Tank, complete with mechanism.

HOISTS
1—No. 22 Vulcan, with Man Cage, 30' Steel Headframe and 40 HP. Single Speed Elevator Type Motor, equipped with Solenoid Brake (Hoist purchased new in 1942).
1—Single Drum Gasoline Hoist, direct connected to 2⅝ x 4¼ Wisc. Gas Engine.
1—3-drum Ingersoll-Rand Slusher Hoist, Model 50-NNN, with built-in 50 HP Gen. Elec. Type K Motor, 3 ph., 60 cy., 220/440 volts, complete with starter and 2—1½ Yd. Crescent Scrapers (used 2 months).

DRILL PRESSES
1—26" Hamilton Heavy Duty Drill Press, line-shaft drive.
1—Kennedy-Otto Drill Press, with 1 HP Gen. Elec. Vertical gearhead Motor, 3 ph., 60 cy., 220/440 volts.

PIPE
Several thousand feet 6" wood pipe, wire reinforced-tar coated.

WOOD BINS
2—Wood Stave Bins 20' x 20'—no bottoms, new condition, complete with hoops.

TROLLEY LOCOMOTIVES
2—7½ Ton Goodmans, 36" Gauge, 250 Volt DC.

WAGON DRILLS
1—Ingersoll-Rand, with drifter, all on pneumatic tires, used about 6 months.
1—Sullivan #IW-6, with drifter, on steel wheels. AC Motor.

COAL CRUSHERS
1—36" American Ring Type.
1—24 x 20 Jeffrey Swing-Hammer Mill.

MOTORS—AC
16—¼ HP. New Leland Single Phase Motors.
10—⅓ HP. New Leland Single Phase Motors.
8—½ HP. New Leland Single Phase Motors.
2—1½ HP. New Leland Single Phase Motors.
2—2 HP. New Louis Allis 3 Phase Motors.
1—3 HP. New Leland 3 Phase Motor.
1—5 HP. New Leland 3 Phase Motor.
2—1½ HP. Used G.E. 3 Phase Motors.
1—2 HP. Used Wagner 3 Phase Motor.
9—5 HP. Used G.E. 3 Phase Motors.
3—10 HP. Used G.E. & West. 3 Phase Motors.
1—20 HP. Used West. 3 Phase Motor.
2—25 HP. Used G.E. 3 Phase Motors.
2—30 HP. Used G.E. 3 Phase Motors.
3—35 HP. Used G.E. 3 Phase Motors.
1—40 HP. Used Allis-Chalmers 3 Phase Motor.
1—50 HP. Used G.E. 3 Phase Motor.
1—75 HP. Used G.E. 2200 volt, 3 Phase Motor.

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15 Tons—40# Rail.
Plate Frog Switches—30# to 60#.
2/0 & 4/0 & 250,000 CM Stranded R.C. Wire.
4/0 Round Trolley Wire.
Switchboard Equipment.

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CRUSHERS

1—18"x18" Link Belt Double Roll Crusher.
1—30"x30" Double Roll Crusher.
1—30"x30" Jeffrey Single Roll Crusher.
1—36"x36" Link Belt Double Roll Crusher.

HOISTS

1—Wellman Engineering Company, single drum hoist, 10' in diameter, 7" face, 1-5/16" between peaks, 5¼" flange, 1¼" rope, 870' per minute. Complete with a 400 HP Westinghouse motor, 2,200 volts, 3 phase, 60 cycle, 250 RPM, type HP, and GE automatic control. CR2124 for mine hoist service, 2,200 volts, 400 HP.

1—Ottumwa Iron Works, single rigid cylindro-conical drum hoist, serial #4088, weight 42,000 lbs., 1¼" rope, complete with remote control and hydraulic brakes direct connected to Western Electric 150 HP. motor, model 17815, type MT-564-10-150-720, form B, 3 phase, 60 cycle, 440 volts, slip ring, secondary volts 388, amps. 187, secondary amps. 182, speed full load 700, serial #4563312, continuous 40° C. Complete with controller and resistance.

1—Ottumwa Hoist #3561, drum diameter 48", face 36", face grooved for 1" rope, equipped with post brake 54" diameter, hand operated, single reduction cut spur gears, 19 teeth and 196 teeth, 1¼" pitch, 10" face, drum shaft 7" diameter, drum shaft bearing 7"x14", pinion shaft bearing 4½"x15" of the ring oiling type, direct connected to 100 HP. Westinghouse motor, type CW, 220 volts, 3 phase, 60 cycle, 360.8 amps, 580 RPM, #2394853.

LOCOMOTIVES

1—8 ton Goodman ball bearing locomotive, 42" gauge, type 32-A0-4T.
1—4 ton Whitcomb Battery locomotive, 36" gauge.
1—6 ton Jeffrey locomotive, 42" gauge.
1—13 ton Goodman ball bearing locomotive, 42" gauge.
2—13 ton Westinghouse ball bearing locomotives, 42" gauge.

RAILS

Carload lots new 12 lb., 16 lb., 20 lb., 25 lb. and 30 lb. rails. Price and delivery information upon request.

MINING MACHINES

4—CLE5 AC, 3 phase, 60 cycle, 220 volt, Sullivan longwall mining machines.
1—Goodman Universal Mining Machine, 112AA, DC, 6½' cutter bar.
1—Goodman Universal Mining Machine, 112AA, DC, 6½' cutter bar.
1—Jeffrey Shortwall Mining Machine, 35 BB, AC, 6' cutter bar complete with tip turn truck, cable and reel.
1—Sullivan Shearing Machine, Class CH11, DC, 9' cutter bar.
2—Sullivan Longwall Mining Machines, type CH8, 2/60/220 volts, 30" cutter bars.

MOTOR GENERATOR SETS

1—75 KW Westinghouse synchronous motor generator set, DC end, 250 volts, 300 amps, 900 rpm. Direct connected to 125 HP, 2200 volt 900 rpm, 3 phase, 60 cycle, 28.6 amp synchronous motor, complete with automatic switchboard and compensator.

50 KW Westinghouse motor generator set, DC end 250 volts, 200 amps, #11, type S, field serial #621994, commutator, #11-1T-135B, 860 RPM, compound, AC end, 75 HP Westinghouse induction motor, type CS, 3 phase, 60 cycle, 2,200 volts, 18.1 amps, per terminal, 40° C temp. rise, 870 rpm, #4364186, complete with switchboard for DC end and compensator for AC end.

50 KW General Electric motor generator set, 258064, type BR, form C, I.S. 250070-39, 200 amps, 250 volts, 1740 RPM, cont, 30°C, direct connected to 75 HP General Electric induction motor, type KT337-4-75-1800 Form B, 3 phase, 60 cycle, 220 volts, 174 amps, 1,750 rpm, #4323202, cont. 40°C, complete with manual switchboard and compensator.

ELECTRIC DRILLS

1—Little Giant AC electric coal drill size 473, 3 phase, 60 cycle, 220 volts, type IPF, serial #143533.
3—Dooley Electric drills, AC, 220 volts, new type.
2—Dooley Electric DC drills, #472.

COPPER

Several hundred feet used 500,000 CM Weatherproof stranded copper.
Several hundred feet used 500,000 CM Bare stranded copper.
Several thousand feet used 4/0 Figure 8 trolley wire.
Several thousand feet 1,000,000 CM lead covered copper.
1,000 feet 2/0 3/Conductor rubber covered cable—used.

VIBRATORS

1—Tyler "600" vibrating screen, size 6x16, three deck.
1—Stephens Adamson 4 x 10 Double Deck vibrator.
1—Link Belt 4 x 10 Double Deck vibrator.
1—Robbins 4 x 10 Single Deck vibrator.

TIPPLE

1—Steel tipple complete with shaker and concrete silos. Capacity 1,000 tons per day.

COAL WASHERS AND CLEANERS

1—Deister Concentrating Table.
1—McNally Pittsburg Box Type Washer.
1—Stephens Adamson Coal Cleaner.
(Complete information on the three above items will be furnished upon request.)

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Weatherproof, durable, 2 conductor, twisted, 2 copper and 2 steel strands. Unused, insulated. On original steel reels.

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Half-mile reels, (approx. 2,600 ft.), 85 lbs.	Ea.	$14.25
One-mile reels, 165 lbs.	Ea.	27.50
500-foot coil, 14 lbs.	Ea.	3.95
1,000-foot coil, 28 lbs.	Ea.	7.25

New W-130—Lightweight Assault Wire

Half-mile reels. (Approx. 2,600 ft.) only 16 lbs. Ea. $15.00

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ELECTRIC LOCOMOTIVES AVAILABLE

907C Balt. West. Bar Steel, 36" g., 250V. New wheels, tires, gears, axles. Inside wheel, 10 ton.

807 GE. C.I. frame 48" g. outside wheels, 8 Ton.

940C West. Bar Steel, 36" g. inside wheels, 5 T. Rebuilt.

944C West. Bar Steel, 36" g. inside wheels, 5 Ton. Non Rebuilt.

Jeffrey MH124, 36" g. Battery Loco., 2 motor, 6 Ton.

Myucha Hercules, 36" g. Battery Loco., 2 motor, 6 Ton.

West. Bar Steel, 36" g., Battery Loco., 2 motor, V42X, 5 Ton.

West. Bar Steel, 36" g., Battery Loco., 2 motor, V49X 5 Ton.

(1) 50 KW, West. SK, 250 V, cp. wd. 835 rpm, DC Generator. Also a number of other smaller Generators, AC & DC.

(1) 200 KW Ridgeway Ind. MG set, 300 V, DC. 2200/60/3/AC, 730 rpm, Rare set only.

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MINE HOISTS: All steel construction, single drum, 8' dia., 3,800 ft. 1½" rope, single line pull capacity 73,000 lbs., with Herringbone gears to operate at a speed of 600 FPM; motor 400 H.P., 580 RPM, 3 phase, 60 cycle, 2,200 volt, complete with all control equipment. Condition like NEW.

1—Single Drum 66" dia., 42" face, 200 H.P., GE Motor, 3 phase, 60 cycle, 2,200 volt, complete with control equipment.

1—Double Drum 38" dia., 42" face, ⅝" rope, 300 FPM, 150 H.P., 440 volt motor.

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Greensburg, Pa.

EQUIPMENT IN STOCK

MINING MACHINES:
Jeffrey, Goodman, Sullivan, D.C. and A.C., 3 phase.

LOCOMOTIVES:
Jeffrey, Westinghouse, General Electric, Goodman, Ironton.

SUBSTATIONS:
Motor Generator Sets. Rotary Converters.

SPARE ARMATURES:
For Locomotives, Machines, Rotary Converters and others.

MOTORS:
D.C. and A.C., 3 Phase.
1—Synchronous 145 H.P., 600 RPM Western Electric type ATA12-150 440 volt, can be rewound—direct connected exciter.

TRANSFORMERS:
3 phase and single phase, also rotary.

MACHINE TOOLS:

CONVEYORS,

LOADING MACHINES,

PUMPS,

COMPRESSORS,

GENERATORS,

WELDERS

GUYAN MACHINERY CO.
LOGAN, WEST VIRGINIA

TRANSFORMERS
CIRCUIT BREAKERS

NEW — REBUILT — RENTALS

1 H.P. to 2500 H.P. motors in stock
D.C. A.C. 25-50-60 Cycle

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ROCHESTER 1, N. Y.

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Small Mines
ROTARY CONVERTER
A Good Machine—A Cheap Price

200 kw General Electric Rotary Converter, 1,200 rpm., 230 volts DC, type TC. With transformers and available switchboards.

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Also in stock: 150 kw M-G Sets and Motors.

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Belt, Bucket, Drag or Gravity
Shaker & Vibrating Screens
Truck Scales — Coal Crushers
Coal Drills — Car Pullers —
Mine Fans — Electric Motors
Floor Cranes — Mining and Stripping Equipment

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100 KW. DIESEL ENGINE GENERATOR SETS

10—100 KW, 250-275 V. D.C. Delco Generators dir. con. to 150 HP., Model GBD-8, 5¾x7, 8 cyl. Superior Diesel Engines, elec. starting with muffler, power panel and accessories.
1—100 KW 220/440 V. A.C. same as above. Practically as good as new—Only Used for Spares.

MOTOR GENERATOR SETS—250 V. D.C.

Motors 220-440 volt or 2200 volt—3 phase, 60 cycle

No.	KW	Make	RPM
1	250	Westinghouse	1200
1	200	Westinghouse	720
2	200	Westinghouse	1200
1	100	Westinghouse	700
1	100	General Electric	900
1	100	Westinghouse	600
1	100	General Electric	1800
1	100	Reliance	580
1	100	Delco	1200
2	90	Westinghouse	680
4	75	Westinghouse	720
1	75	Westinghouse	1200
1	60	Westinghouse	1200
1 NEW	50	General Electric	1800
3	40	Westinghouse	900
2	30	Westinghouse	720

125 V. D.C. M.G. Sets

1—100 kw. G.E. 125 v. 900 rpm. 220/440 v. 3 ph. 60 cy. AC Syn.
1—125 kw. G.E. 125 v. 1200 rpm. 220/440 v. 3 ph. 60 cy. AC.
1—75 kw. West. 125 v. 1200 rpm. 220/440 v. 3 ph. 60 cy.

HOISTS

1—Welen 2 drum 8600# per drum, each drum is 6' cir. with 630 ft. of ⅝" cable per drum can be increased to take 600'. 120 FPM per drum, driven by 25 HP., 1750 rpm., 230 v. D.C. Mtr.

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200—1½ ton Hand Cranked ratio 27.1 thru an enclosed double reduction gear unit with 4 planetary gears mounted on steel plate complete with 48' of ¼" cable, ratchet type brake, push button release.

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100—Brand New with ¼" cable, 1½ and 2 ton A.C. or D.C. Motors.

SLIP RING MOTORS—3 ph. 60 cy.

No.	H.P.	Make	RPM	Volt
1	1000	G.E.-MT	900	2200/440
1	800	G.E.-MT	900	2200/440
2	800	West. Cw	567	6600
1	600	G.E.-MT415	900	2200/4000/220/440
1	350	West. CI	1150	220/440
1	250	Allis Chal.	870	2200
2	250	West. CI	1150	220/440
1	250	West. CW	1800	220/440
1	200	West. CW	1800	220/440
1	150	West. CW	1150	2200/220/440
1	125	West. CW	800	2200/220/440
1	100	West. CW	720	2200/220/440
1	100	Triumph C-17	580	550/440/220
1	75	G.E. I-M	720	220/440
1	75	West. CW	1800	220/440
1	60	West. CW	900	220/440
1	60	G.E. IM	720	220/440
4	50	West. CW	870	2200/220/440

230 V. D.C. MOTORS

Qua.	HP	Make	Type	Speed
2	300	West.	—	900
2	200	Reliance	—	400
1	150	West.	SK	1400
6	100	Reliance	—	400
1	100	West.	SK	500
1	100	West.	SK	640
1	100-125	West.	SK-190	560
1	100	West.	S	625
1	100	G.E.	RC	650
1	90	West.	SK	575
1	80	West.	76A	450
1	75	Allis Chal.	—	600
3 New	75	Cr. Wh.	WP	860
1	75	West.	SK	1100
1 Vert.	75	West.	SK	1100
1	75	West.	—	1100
1	60	West.	SK	1750
1	60	West.	SK-153	850
1	60	West.	S	900
1	60	West.	SK-150	875
1	50	West.	SK-143	850
1	40	West.	MC	625
2	35	Allis Chal.	—	1800
1	30	G.E.	LC	530
1	30	West.	SK	975
1	30	West.	S-6	700
1	30	West.	SK-130	725
1	30	Allis Chal.	—	950
1	30	West.	—	975
1	25	G.E.	CD-123	300
1	25	West.	SK-130	600
1	25	Allis Ch.	—	700
2	25	West.	SK	1100
1	25	West.	SK-120	825
1	25	West.	SK	950
1	25	Fair. Morse	CF	950

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1—35,000 lb. Nordberg Sgl Drum AC
1—10,000 lb. Cap. Nordberg Sgl Drum AC
1—17,000 lb. Ottumwa Sgl Drum AC
1—10,000 lb. Lidgerwood Sgl Drum AC
1—16,000 lb. Sgl Drum Lidgerwood AC
1—15,000 lb. Wash. Iron Wks Sgl Drum AC
1—30,000 lb. Allis-Chalmers Sgl Drum AC
1—20,000 lb. Dbl Munday w/o motor

CRUSHERS

2—No. 800B Pitman, new
1—12x16 Eagle Dbl Roll
1—3B American pulverizer
1—30x54 McNally Pitts. Sgl Roll
1—10x20 Universal Sgl Roll portable
1—24x20 Penn. Sgl Roll
1—No. 75 Marcy Ball Mill
1—24x20 Dixie Hammer Mill
1—40x22 Pioneer Dbl Roll with Hopper

DIESEL GENERATING EQUIPMENT

Units, 60 to 900 KW with diesel engines.

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2—112AA Goodman Universal, D. C.
4—112G3A Goodman Universal, 220 V., A.C.
2—112G3 Goodman Universal, 220 V., A.C.
1—12AB Goodman Universal, D.C., Permissible Type.
3—35B Jeffries Machines, 250 V., D.C.
6—CE7 Sullivan Machines, A.C.-D.C.
1—7B Sullivan Machine, 250 V, D.C.

LOCOMOTIVES

2—6 Ton Goodman type 33 Ball Bearing.
1—8 Ton Goodman type 32 Ball Bearing.
2—5 Ton Goodman type 2600 Ball Bearing.
1—6 Ton G.E. type 42 inch Gauge.
1—5 Ton Mancha Storage Battery Locomotive, 36 and 42 inch Gauge, Height, 43 inches. Complete with Storage Battery and Charging Panel.
2—6 Ton Westinghouse Ball Bearing.

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3—5BU Joy 42-Inch Gauge on Cats, D.C.

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Boiler Tubes • Pipe
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1—500 KW G.E. Syn. 575 V. 900 RPM
1—400 KW WEST. Syn. 575 V. 720 RPM
2—300 KW G.E. Syn. 275 V. 1200 RPM
1—200 KW G.E. Syn. 275 V. 900 RPM
1—150 KW G.E. Syn. 275 V. 1200 RPM

SYNCH. CONVERTERS

1—300 KW G.E. 575 V. HCC 1200 RPM
1—150 KW G.E. 275 V. HCC 1200 RPM

GENERATOR ARMATURES

1—500 KW G.E. 275 V. MFC Form L 900 RPM
1—500 KW G.E. 575 V. MCF Form H 900 RPM

CONVERTER ARMATURE

1—300 KW G.E. 575 V. HCC Form P 1200 RPM

LOCOMOTIVES

2—30 T JEFFREY 250 V. MH-77 48-36" Ga.
1—20 T JEFFREY 250 V. MH-77 48-36" Ga.
3—13 T JEFFREY 250 V. MH-2110 42-32" Ga.
1—13 T G.E. 250 V. MH-827 44-36" Ga.
1—13 T WEST. 250 V. ML-908-C 44-36" Ga.
1—10 T JEFFREY 250 V. MH-110 44-32" Ga.
1—8 T G.E. 250 V. HM-839 44-36" Ga.
1—8 T WEST. 250 V. ML-906-C 44-36" Ga.
1—4 T WEST. 250 V. ML-903-B 32-22" Ga.

LOCOMOTIVE MOTORS

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2—G.E. 500 V. HM-820-A, Ball Bearing
2—WEST. 250 V. ML-908-C, Ball Bearing
2—WEST. 250 V. ML-907C, Ball Bearing
2—WEST. 250 V. ML-906-C, Ball Bearing
2—WEST. 250 V. ML-901-C, Ball Bearing
2—G.E. 85/125 V. HM-828-A, Ball Bearing

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REAL BARGAINS

MOTOR GENERATOR SET
Westinghouse, 75 KW, 2200 Volt AC, 275 Volt DC, 4000-2300 AC.

ROTARY CONVERTERS
General Electric, 50 KW, 2300 AC Primary, 275 DC Volts.

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12AA Goodman with truck.

I BEAMS
10 Inch—Heavy Section.

HAND WINCHES
All-Steel, Three Ton Capacity.

COPPER WIRE
500,000 CM Bare and Insulated.
4/0 Grooved and Figure 8 Trolley.

RAIL
100 Tons 25# Rail.
110 Tons 70# Rail.
40 Tons 80# Rail.
All in excellent condition.

25# STEEL TIES
44" Gauge—Like New.

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Priced to Sell

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1—Sterling Diesel Tandem Tractor with a new H.B. 600 Cummings Motor. Tractor completely rebuilt two months ago by Sterling Motors.

1—90 Ton Rogers "I" Beam Trailer.
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WANTED
1—Model 132 Hanson Shovel Front.

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3 Model MTB-20" LaDel Belt Conveyors, 1,250-ft. each, 25 HP Drive, Honored and Goodgear belt, in excellent condition.
1 Jeffrey 35B Mining Machine, 220/440 A. C.
1 Jeffrey 35-20 Mining Machine 220/440 A. C.
7 Model FA LaDel Chain Conveyors.
2 Model FF LaDel Face Conveyors.
5 Model UN-17 LaDel Shaker Conveyors—15 HP Drives.
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10 Little Giant Coal Drills #572. 440 Volts.

WANT TO BUY:

1 Gathering Locomotive, 4 to 6 tons; 48" gauge, maximum height 25 inches. 250 Volts D. C.
1 212AA Goodman Mining Machine with trucks and cable reel. 250 Volts D. C.
1 150-200 K.W. Rotary Converter, 250 V., D. C., complete with transformers and control panel. 2500-1000 3ph/ 212.
50 Rotary dump mine cars, 48" gauge, 7½ feet wide, 14 feet bumper to bumper. Dump height 20", overall height 32" above rail. Weight approximately 4,800 pounds.

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INCORPORATED

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M-G SETS—AC to DC
300 KW Allis Ch. DC 250 V., synch. motor 440/2200 V.
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250 KW Allis Ch. DC 250 V., synch. motor 440 V.
200 KW Ridgeway DC 550 V., synch. 2300/4000 V.
150 KW Cr. Wh. DC 250 V., synch. motor 440 V.
100 KW G.E. DC, 250 V. motor, 2200 V.

D.C. MOTORS—230/250 V.
150 HP Cr. Wh. b.b. TEFC 600 RPM.
100 HP Whse. SK184 450-900 RPM.
100 HP G.E. type C 575/1150 RPM.
80 HP G.E. CDM 1,800 RPM, b.b. drip (2).
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25 HP G.E. CD85, 1750 RPM.
D.C. Generators—250 Volts.
150 KW, 100 KW, 90 KW, 75 KW, 50 KW.

Complete Stock A.C. Motors—New and Rebuilt Up to 500 H.P.—Sq. Cage, Slip Ring, Synch.

SPECIAL—2—300 H.P. Allis-Ch. slipring motors, 720 RPM, 2,200 volts.

Gear Head Motors Speed Reducers Pumps—Blowers
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2" PIPE

Best Price
Excellent Condition
Large Quantity Available

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BUY NOW—IMMEDIATE DELIVERY
NEW—Gomco 20" B.G. Crank Shaper. Rapid traverse.
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141 DW-10 Caterpillars with Scrapers.
Marion Model 262 Shovel Front.
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Type No. VDIR4 Vulcanizers.
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Price $59.95 Per Complete Kit.

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FOR SALE FROM MINE OPERATOR

1—Reliance Electric and Engineering Co. Motor Generator set, 75 KW capacity. Motor 600 V. DC, generator 250-V. DC, mounted on base. Complete unit brand new and never operated.
2—Reliance Electric and Engineering Co. Motor Generator sets, 40 KW capacity. Motor 500 V. DC, generator 275 V. DC, both units in good operating condition.

The Davis Coal and Coke Co., Thomas, West Virginia

LOCOMOTIVES
1—10 Ton Jef. with MH110, 250 V. Motors.
1—10 Ton West. with 507C Motors.
1— 8 Ton G.E. with HM829 BB Motors.
1— 8 Ton Jef. with MH100, 250 V. BB. Motors.
1— 6 Ton G.E. with HM823 BB Motors.
1— 5½ Ton Ironton Battery.

CUTTING MACHINES
1—29 LE Jef. arc wall, turnover head.
2—35HB Jef., 250 V. D.C. Short Wall.
1—35HB Jef. Short Wall, A.C.
3—35B 250 V. D.C. Short Wall.
1—124 EJ Goodman Slabbing, D.C.
1—112 AA Goodman Short Wall.

LOADING MACHINES
3—14 BU D.C. on Cats.
1—7 BU Joy D.C. on Cats.
3—8 BU Joy D.C. on Cats.
2—360 Goodman, 42" on wheels.
1—L400 Jef. on wheels.

SHUTTLE CARS
1—42E Joy Cable Reel.
2—32E Joy Cable Reels.
1—6 SC-5HXC Joy Cable Reel. (New).

We have Motor Generator Sets, Crushers, Motors, Pumps, Compressors, Rotary Converters, etc.

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PITTSBURGH 6, PA.

HIGH GRADE TOOLS

BROWN & SHARPE #2B. DOUBLE OVER-ARM LATE TYPE MOTOR DRIVE.
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18"x54" centers Lodge & Shipley, late type, Lathe.
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24"x168" centers Sidney 16 speed Geared Head Lathe.
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Gisholt #4L Turret Lathe.
12'x¼ Niagara Shear, M.D., 14" Gap.

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1 35 BC Jeffrey Cutting Machine.
1 35 A Jeffrey Cutting Machines.
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276 61 AM Jeffrey Conveyor Pans, 5"-12" wide & 6' long.
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270 61 AM Jeffrey Conveyor Chains, 12' long.
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21 61 HG Face Conveyor Pans, 5' long & 15" wide.
21 61 HG Face Conveyor Chains, 10' long.
2 61 EW Jeffrey Elevators (5 HP-DC Motors).
1 Brown-Payro Car Spotting Hoist—5 hp.
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1 6 Ton Jeffrey MH-88 Locomotive.
1 McGowan 3" Piston Pump, 5 HP Motor.
1 Set MH-88 Jeffrey Locomotive Trucks, 6 ton.
1 Set Motor Trucks for 6 Ton G.E.

Equipment is 250 V., D.C., 48" Gauge Track.

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Sprigg, West Virginia

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USED D.C. MOTORS

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7½ h.p. G.E. 1 v.—600/1300 r.p.m.
7½ h.p. G.E. 230 v.—1150 r.p.m.
5 h.p. C.W. Vertical. 230 v.—900 r.p.m.
5 h.p. G.E. 230 v.—450/1800 r.p.m.
5 h.p. West. 220 v.—835 r.p.m.
1 h.p. G.E. 230 v.—525/2100 r.p.m.
1 h.p. G.E. 230 v.—1150 r.p.m.

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ALL MOTORS TESTED AND "IN STOCK"

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CARLYLE RUBBER PRODUCTS ARE NEW, GUARANTEED & LOW PRICED

NEW GUARANTEED

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ABRASIVE RESISTANT COVERS

Width	Ply	Top-Bottom Covers	Width	Ply	Top-Bottom Covers
48"	8	1/8" — 1/16"	24"	4	1/8" — 1/32"
42"	5	1/8" — 1/16"	20"	5	1/8" — 1/32"
36"	6	1/8" — 1/16"	20"	4	1/8" — 1/32"
30"	6	1/8" — 1/16"	18"	4	1/8" — 1/32"
30"	5	1/8" — 1/16"	16"	4	1/8" — 1/32"
26"	5	1/8" — 1/32"	14"	4	1/16" — 1/32"
24"	5	1/8" — 1/32"	12"	4	1/16" — 1/32"

Inquire For Prices — Mention Size and Lengths

TRANSMISSION BELTING

HEAVY-DUTY FRICTION SURFACE

Width	Ply	Width	Ply	Width	Ply
18"	6	10"	6	6"	5
16"	6	10"	5	5"	5
14"	6	8"	6	4"	5
12"	6	8"	5	4"	4
12"	5	6"	6	3"	4

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ENDLESS "V" BELTS

"A" Width All Sizes —
"B" Width All Sizes —
"C" Width All Sizes —
"D" Width All Sizes —
"E" Width All Sizes —

Sold in Matched Sets.
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FIRE HOSE
APPROVED SPECIFICATION HOSE EACH LENGTH WITH COUPLINGS ATTACHED

I.D. Size	Length	Per Length
2½"	50 feet	$28.00
	25 "	16.00
2"	50 "	23.00
	25 "	13.00
1½"	50 "	20.00
	25 "	11.00

Specify Thread On Couplings

AIR HOSE

I.D. Size	Length	per Length	Universal Couplings
½"	25 feet	$5.00	$1.50 Pair
	50 "	10.00	1.50 Pair
¾"	25 "	7.50	1.50 Pair
	50 "	15.00	1.50 Pair
1"	25 "	10.00	1.50 Pair
	50 "	20.00	1.50 Pair

LARGER SIZES ALSO AVAILABLE
All Prices—Net — F.O.B. New York

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I.D. Size	Length	per Length	I.D. Size	Length	per Length
¾"	25 feet	$4.25		35 feet	$10.50
	50 "	8.00		40 "	12.00
1"	25 "	6.25		50 "	15.00
	50 "	12.50	1½"	25 "	10.00
1¼"	25 "	7.50		35 "	14.00
				50 "	20.00

Each Length with Couplings Attached

CARLYLE RUBBER CO., Inc.

62-66 PARK PLACE, NEW YORK 7, N. Y. Phone: BArclay 7-9793

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Converters, Motor Generator Sets, A.C. and D.C. Motors, Control Equipment and Transformers.

We build equipment to fit your requirements. Over 25 years engineering background.

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P.O. BOX 3227, TEL. 38-136
CHARLESTON, W. VA.

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MOTORS

150 HP. 900 RPM. Elec. Mach., 220/3/60 Syn.
125 HP 1800 RPM. West. SK 230 v. D.C.
80 HP. 1200 RPM. Cr. Wh. 220/440/3/60 Ind.
75 HP. 900 RPM. Elec. Mach. 220/3/60 Syn.
75 HP. 1800 RPM. US 220/440/3/60 Ind.
50 HP. 1200 RPM. GE 220/3/60 Slip Ring.
5, 7½, 10 and 15 HP. AC & DC TEFC & Open

SYNCHRONOUS ROTARY CONVERTERS

Qn.	KW	Make	Speed	DCV
		6 ph. 60 cycle		
1	500	G.E.	1200	600
2	300	G.E.	1200	600
1	300	G.E.	1200	275
4	175	G.E.	1200	275
		3 ph. 60 cycle		
1	175	G.E.	1200	275
1	75	G.E.	1800	275

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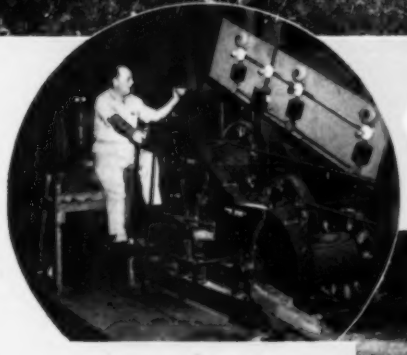
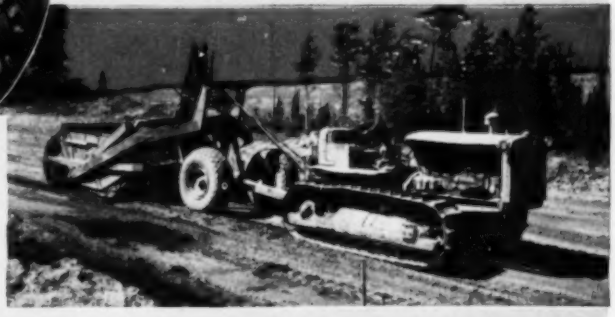
Improved Performance with LAY-SET PREFORMED

In strip mining costs are figured on a "per-ton" basis. The faster the overburden is handled and the coal or minerals speeded to market, the more profit "per-ton." Dependable wire rope helps lower costs because there are fewer shut-downs. LAY-SET Preformed's *improved performance* makes it dependable . . . and a favorite wire rope of strip operators everywhere.



Hoists on construction jobs require safe, dependable wire rope because a single line is used to lift materials—and men. Here's a job for LAY-SET Preformed, the Green Strand Wire Rope with improved plow steel wires. It has great strength and flexibility. It means *improved performance.*



Building roads and dams is another use of wire rope where LAY-SET Preformed gives *improved performance.* Hazard's Streamlined Scraper Cable was designed for this tough service. It stands shock loads and lasts longer bending around small sheaves.

For every wire rope use *— in mining, industrial, contracting— there are HAZARD Wire Ropes that will improve performance. And there is a HAZARD distributor near you who can supply your needs. Call him today for full information.*

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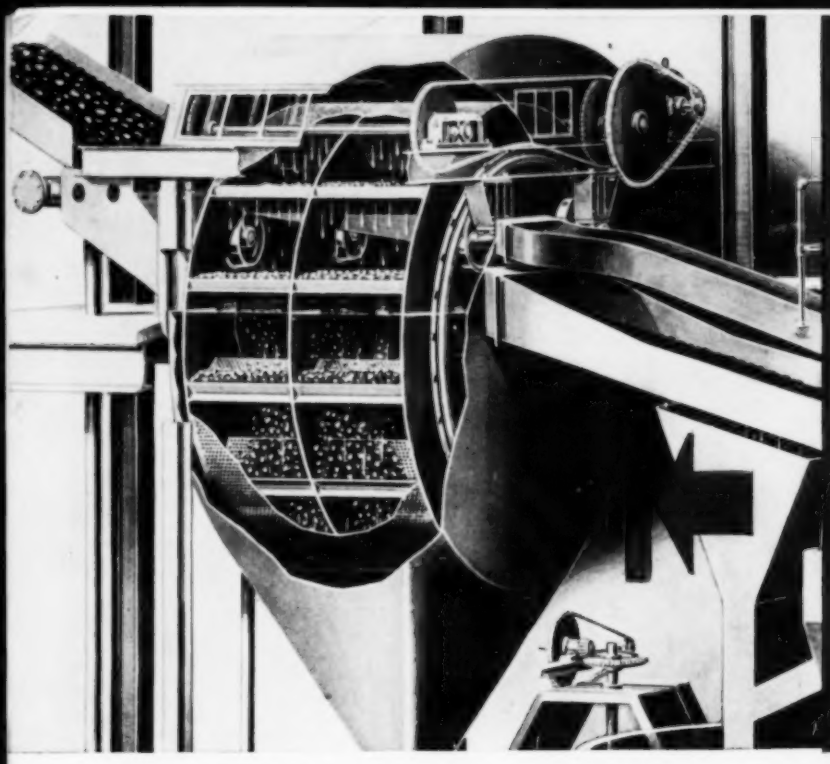


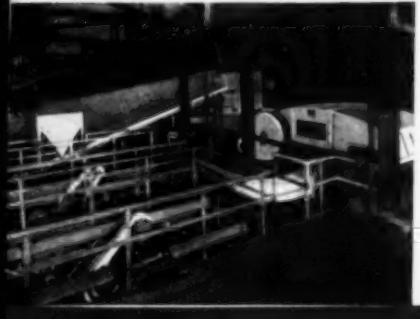
REPORT on the FIRST LINK-BELT Heavy-Media Concentrator Installation

Pittsburgh Coal Co. adds another unit

The first Link-Belt Float-Sink Concentrator installation for Heavy-Media coal cleaning was made on a pilot or experimental basis for the Pittsburgh Coal Company early in 1946. This worked out so well that it was subsequently put into full scale commercial operation. This original Link-Belt Concentrator is effectively cleaning 250 tons per hour of washery middlings on a double shift basis. This unit greatly increased the overall plant capacity, raised its efficiency, cut costs and improved the marketability of the products.

Pittsburgh Coal Company has now installed a second Link-Belt Float-Sink Concentrator at the same operation to clean 8" x 3" egg size coal. This unit replaces a picking operation and does the job more uniformly, more efficiently and at a greatly reduced cost. Coal is received by the Concentrator directly from the R.O.M. shaker screen, is cleaned, rinsed and dewatered in the space formerly occupied by the picking table.

- **Lower cleaning cost**
- **Eliminates the picking operation**
- **Improves marketability of coal through better quality**
- **Greater plant capacity in same space**
- **Higher efficiency**



For complete information about this and other Link-Belt Heavy-Media installations, get in touch with our nearest office.

LINK-BELT COMPANY

Chicago 9, Philadelphia 40, Pittsburgh 13, Wilkes-Barre, Huntington, W. Va., Denver 2, Kansas City 6, Mo., Cleveland 15, Indianapolis 6, Detroit 4, Birmingham 3, St. Louis 1, Seattle 4, Toronto 8.

11,534

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